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THE  
SEARCH FOR NITRE,  
AND  
TRUE NATURE OF GUANO,  
&c.



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THE  
SEARCH FOR NITRE,  
AND THE  
TRUE NATURE OF GUANO,  
BEING  
AN ACCOUNT OF A VOYAGE  
TO THE  
SOUTH-WEST COAST OF AFRICA;  
ALSO  
A DESCRIPTION OF THE MINERALS FOUND THERE,  
AND OF  
THE GUANO ISLANDS IN THAT PART OF THE WORLD.

BY

T. E. EDEN, JUN.,

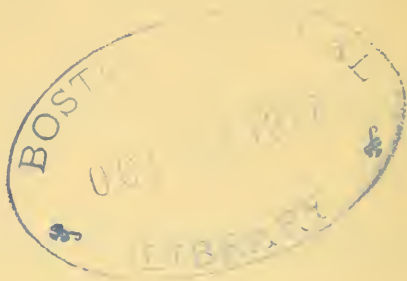
MEMBER OF THE ROYAL COLLEGE OF SURGEONS IN LONDON.

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## PREFACE.

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THE portion of the African coast referred to in this book is situated between the 28th and 22d parallels of south latitude, and has not hitherto been described, except in 'A Narrative,' published by Morrell, an American ship-master, which is not to be depended upon.

Morrell's voyage was made in 1828, and in 1836 Captain Sir J. E. Alexander undertook 'an expedition of discovery into the interior of Africa,' but his route, as laid down in the map, is seldom nearer than 120 geographical miles from the coast, and he did not reach the sea except at Walwich Bay.

The object of the voyage was to obtain, first, nitre ; secondly, minerals of value ; thirdly, guano. The information respecting the first was false, the examination for the second was insufficient, and very little guano was left on the coast ; so that this speculation, which has created considerable sensation in the commercial world, may be said to have failed in all respects.

The remarks herein contained might easily have been extended into a thick octavo volume ; but as my intention has not been so much to write a book as to communicate facts, and as this work was composed more expressly for the perusal of merchants, whose time is commonly too much occupied to read long chapters and detailed accounts, I have endeavoured to make my observations as concise as possible: and am consequently aware that many of my sentences will be found short and abrupt. In the description of a voyage a great attention to style can scarcely be expected ; and in this respect,

on the present occasion at least, I believe I may say with Pope ;

“ Nor Fame I slight, nor for her favours call ;  
She comes unlook'd for, if she comes at all.”

I much regret, that in consequence of the necessity of procuring without delay some cargo for the ship, I was unable to pay that attention to natural objects which I desired : such as came in my way, while searching for minerals, I have picked up. Of the plants, very few were in flower, it being the winter season, and I had no convenience to bring home living specimens. Neither have I had an opportunity of observing a single section of the country, so that the geological remarks are such only as could be made from a cursory observation of the surface.

The scientific reader will perhaps be entertained with the new views taken in this work respecting the nature of guano ; but should my general readers

be disappointed, I hope they will take into consideration that I am here describing a coast *almost* without water, vegetation, or inhabitants.

P. 15, l. 35, *for* crassicauli, *read* crassicaule.

l. 36, *omit* cactus.

P. 24, l. 10, *for* now, *read* never.



## A VOYAGE, &c.

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### CHAPTER I.

Introductory remarks—Contagious nature of speculation—Schooners best adapted for exploring voyages—Coast not yet properly examined—Nitre may still exist in Africa—Our errand no secret—Instances of falsehood, ignorance, and misrepresentation—Departure from Liverpool—Whales—Porpoises—Stormy petrel—Flying-fish—Portuguese men-of-war—Instructions opened—Extreme westing and southing—Greatest distance run—Land of Africa—Dews and fogs—Albatross rock—Arrival at Possession Island.

THE spirit of adventure is the soul of commerce, and merchants who embark their property with a view to its extension, are highly deserving of commendation. It is not to be wondered at if they are sometimes deceived by the unprincipled, this is one of the evils inseparable from commercial affairs; for speculation, like hope, "has often told a flattering tale." We are generally inclined to believe what we wish to be true; and when once the impression is made upon our minds, it becomes increased and strengthened by every circumstance which favours the view we take.

The actious of a mercantile firm of acknowledged

respectability are regarded as an example by those of an inferior standing or less capital; and if the information prove false, the evil is extended like a contagious disease. It is, indeed, as impossible to foresee the result of speculation as it is to know the future: that for guano, on the south-west coast of Africa, has probably made the fortunes of some, but that for nitre has proved a failure; the former, however, differed from the latter in its more gradual advance.

Merchants often pay large sums of money to those who afford them information, and a temptation like this is not to be resisted by those who have the disposition and opportunity to deceive.

Some persons had the effrontery to present to eminent firms in London, Liverpool, and other places, large and beautiful crystals of nitrate of potash; which they declared by the most solemn asseverations had been procured by them from the south-west coast of Africa. But with gross falsehood there has been also much ignorance combined, and it would appear that the ammoniacal salts found in guano had been mistaken for nitrate of soda.

The instructions afforded to the different vessels were many of them in the same hand-writing, and the same words, or were so like in matter, as to lead at once to the conviction that they had all originated in one individual.

Tempted by such flattering appearances, many firms of great prudence and respectability have speculated extensively, in the hope of finding nitre on the south-west coast of Africa.

Had not the information been so precise as to declare positively that it existed in *millions of tons*, and in certain defined spots, the expedition might

have been more fortunate ; for it is plausible to suppose that nitre should coexist with guano on the south-west coast of Africa, as well as on the corresponding part of America ; but this could have been determined without incurring such enormous expenses. A small schooner might have been engaged, under the directions of a scientific person, unfettered by instructions, except of a general nature, and with full permission to examine *any* part of the coast which appeared likely to be advantageous. Schooners are best adapted for such expeditions, as they can venture with safety where large ships cannot, and if no discovery be made, can obtain cargo or freight in many parts where the size of other vessels would be objectionable. So that if nothing were gained, very little could be lost. Large vessels, whose daily expenses are considerable, cannot devote sufficient time for the proper examination of a district, so that many things of advantage may have been passed over, after all the explorations made. I am not at all satisfied with the manner in which the country has been examined, and am still of opinion that discoveries might be made which would amply repay the expense and trouble of the search. I have only examined the coast from Wall's Island to Walwich Bay, and have never exceeded the distance of six or eight miles from the sea ; much, indeed, of this part I have not had the opportunity of seeing : many parts, which have not been visited at all, may abound in minerals of great value ; and even nitre may still exist at no very great distance from the sea. The explorations in the present voyage have been confined to such distances from the coast as would admit of cargoes being readily obtained ; I am informed, however, upon good au-

thority, that the nitre of the American continent is not found nearer the sea than from six to thirty miles; and it is worthy of remark, that it was discovered by a scientific pedestrian, Baron Von Humboldt. The nature and wording of the instructions given to most of the ships pointed particularly to certain parts of the coast only; the others have, therefore, been generally passed over; so that the most important question in this voyage, viz. the existence of nitre in this part of Africa, is not yet determined.

I was much surprised to find, upon our arrival at Possession Island, that what was considered a profound secret at home was not a secret there; but “a bird of the air shall carry the voice, and that which hath wings shall tell the matter.” Ecclesiastes x. 20.

Among the instances of falsehood, ignorance, and misrepresentation which have occurred during this voyage, I shall mention the following.

A person applied to a merchant in Liverpool, with some very fine crystals of nitrate of potash, which he said he had picked up at Elizabeth Bay; and affirmed that millions of tons could be obtained. He described the place, and subsequently marked it with pencil on a chart. As, upon being submitted to a chemist, it was found to be worth 24*l.* per ton, he was engaged as supercargo, with a liberal salary and commission. Upon this *gentleman's* arrival at Possession Island, he was recognized by an old shipmate, who he supposed might betray him; to prevent which he slipped into his hand a letter, of which the following is a copy:

“DEAR SIR,—No doubt it is a matter of surprise to know what brought me here with my hands



in my pockets. I have come out on the speculation of finding the *nitre* of soda ; and if it is found, I am to act as agent to the owners of the ——, and if it is not found, I lose all my time, and get nothing for it.

“ Now, my dear fellow, I have a very great favour to ask of you, and knowing your good disposition, I am not afraid of your granting it. It is to keep it a secret my having sailed with you last voyage, and not take any notice of me ; but if it should happen to be known, and you asked if I went on shore near Possession Island, to say yes, and that the —— made the land to the south of it.

“ I do not think it likely that you will be asked such a question ; but if it should happen, attend to what I have said, or you will get me into difficulties ; and should it lay in my power to repay your kindness I will.

“ I hope you are comfortable. After you have read this paper destroy it.”

As no signature was affixed to this precious epistle, let his own iniquities find him out ; I shall not further expose him, and have therefore purposely omitted the names of the vessels.

To give the man a fair chance, however, no notice was taken of the letter, and he was accompanied to the spot which he described, and expressed himself satisfied that it was the same place as that in which he pretended to have landed in a boat the previous voyage. He said, however, that the place was entirely altered since he was there ; and, of course, could not find a particle of nitre. His lot happening to be to carry the grog bottle, on the return, he fell down, from drunkenness and mortification, broke

the bottle, and said that he had sprained his ankle, and could proceed no further. Had it not been for the humanity of the captains with him he would have been left behind. The fact was, as his letter proves, that he had never landed at all at that part of the coast ; but hearing something of the speculation in England, concluded that he might be a gainer, but could not be a loser. He subsequently shipped before the mast in a vessel loading with guano, which he, however, abandoned at St. Helena, and I am informed left that place for America.

The captain of a brig lying at Possession Island, on one occasion to the mate, and subsequently to myself, showed a few crystals of impure nitrate of soda. He said that he found them about three miles and a half from the sea, in the neighbourhood of Wall's Island. The information being communicated to some other gentlemen, it was determined to get a brig under weigh the next morning, and her topsails were loosened accordingly. It was amusing to observe another vessel loosening her topsails at the same time, and preparing to follow in our wake, and join in the race for fortune and success. We went on board first to obtain further information from the captain alluded to. He then described more particularly the spot, and sketched a pencil chart of it ; but upon being cross-examined, he prevaricated, and it was thereupon determined not to proceed with the brig ; but in order to leave nothing untried, to take a boat to Wall's Island the next day. We accordingly did so ; but the weather not permitting us to land, we returned, and proceeded the following morning on foot ; but after being away two days, and sleeping under the lee of a sand-hill, we returned, as we expected, unsuccessful.

A sample of fine copper ore was given me by a gentleman, part owner and captain of one of the vessels on the coast, which he informed me had been presented to him by a *friend* at Ichaboe last voyage, who said that he picked it up about half a mile from the beach, while taking a walk upon the main land. An analysis was shown me, of which the following is a copy :

Copper	.	.	20.11
Iron	.	.	20.10
Sulphur	.	.	23.76
Silica	.	.	33.40
Manganese and loss	.	.	2.63
			<hr/>
			100

I was further informed that it was currently reported in a part of Scotland, that a shaft had already been sunk on the spot, and that two vessels were coming out, provided with mining tools,\* gunpowder, &c. Upon our arrival at Ichaboe, however, we found neither shaft nor copper ore.

I saw at Possession Island a *printed* chart of an island, called Gallovidia, and said to exist near Ichaboe; but some captains, who sought very anxiously for it, both by walking along the coast in the neighbourhood referred to, a distance of forty miles, as well as sailing along it, could not discover anything of the kind. Hundreds of thousands of tons of guano were said to exist on this promising island.

As an instance of ignorance I may quote the following. A schooner took home many tons of what was considered by the captain as gold dust, but which was nothing better than yellow mica. The

\* These vessels fortunately received timely notice of the imposition.

captain called it ballast ; but upon his arrival at an Irish port, the officers did not regard it in that light, and therefore seized the glittering prize.

The hopes of merchants at home and of persons engaged in the voyage, have been buoyed up by the contents of a work entitled " Morell's Narrative of a Voyage to the South-west Coast of Africa," which was so greedily purchased that a sufficient number of copies could with difficulty be obtained. I shall have occasion, in the course of this book, to point out numerous errors in that publication for which I am unable to account.

To disentangle the truth from such a mass of misrepresentation, and to publish an account of what *has* been found, and the researches which have been made, I have considered would be acceptable and interesting to merchants in general, and to those who have speculated in particular ; and I trust no further apology need be offered for this little book.

I embarked on board the fine fast-sailing barque *Jessie*, of Liverpool, of the burden of 573 tons, new register, and bound to the south-west coast of Africa for nitrate of soda, which was said to exist in great abundance in certain spots particularly indicated in sealed instructions, which were not to be opened till we were in the latitude of 5 deg. south of the equator.

We left Liverpool February 20, 1845 ; had contrary winds out of channel, but made Scilly light on the Monday following. On the 8th of March we saw Teneriffe and Palmas, two of the Canary isles ; on the 11th we were becalmed, and the waters were without a ripple : we experienced, however, heavy rollers from the direction of the south-west.

Two whales, of the species called fin-backs, and

shoals of porpoises, were seen sporting on the surface. A small bird, the stormy petrel, called by the sailors (for Jack has a name for everything,) Mother Cary's chicken, made its appearance here. It has brown plumage, with a white band, extending from the posterior edge of the wings to the base of the tail; is about the size of a starling, and follows the ships for many hundreds of miles. The sailors have a superstition that it hatches its eggs under its wings. I have not seen it near the land, nor beyond the tropics. Flying-fish made their appearance about the same time; I first supposed them to be the little bird just alluded to, till I saw them enter the waters. They do not leap, but fly in shoals for a considerable distance along the surface. Their pectoral fins move rapidly, like the wings of birds; they are sometimes pursued by the dolphin, albacore, and boneto.\* A minute species of medusa came to the surface, and inflated a membranous bladder like a soap bubble, which kept them afloat, and catching the wind, wafted them along. The sailors call them Portuguese men-of-war. As the wind rose I had an opportunity of observing the formation of the waves; the ripple begins in squares, or four-sided figures, which gradually increase in size. As we steered to the north-west in order to get into the breeze, it be-

\* I was much gratified with an exhibition of this nature on the voyage home, viz., that of a fish, called the boneto, in pursuit of a flying-fish, leaping successively out of the water after it. One of these fish flew on board during the night, and came into my possession. It was about the size of a herring, supplied with dorsal, caudal, and ventral fins; the pectoral fins (wings) were very much enlarged, fan-shaped, six inches in width at their anterior and external edges, two inches at their posterior edges, and three quarters of an inch where joined to the body; the rays which supported the membrane of which they were composed were fourteen in number, articulated in several pieces, and bifurcating twice as they pass outwards. When they fly the tail has an inclination downwards.

came stronger, and verged gradually into the north-east trade-wind, of which, however, we had but little during the passage out. We crossed the equator on the 27th, in 20 deg. W. longitude, and saw several vessels, both homeward and outward-bound. On the 2d of April, in lat. 5 deg. 6 m. S. the instructions were opened, and we knew for the first time the precise spot to which we were bound. On the 17th we were in our extreme west, being in long. 28 deg. 30 m. W.; and on the 24th we made our greatest southing, being in lat. 37 deg. 21 m. S. On the 30th, in lat. 33 deg. 54 m. S., and long. 2 deg. 14 m. W. we made our greatest distance, having run, by the log, during the previous twenty-four hours, 262 miles. On the 2d of May, in long. 2 deg. 18 m. E., with heavy rollers and no wind, the main-top-gallant mast was carried away by the lurching of the ship; and on Thursday, May 8, about 4 p.m. in long. 15 deg. 37 m. 30 s. E. and 28 deg. 1 m. 42 s. S. latitude, we made the land of the south-west coast of Africa.

We proceeded to within about three miles of the shore, and then altered our course from east to about north. The land appeared high, with hills in the background, of a brown colour, barren, and principally consisting of disintegrated rocks, some of which were stratified. We hauled off the land at night, taking in sail, and in the morning again steered to the northwards. On the 9th I had a first specimen of the fogs and mists of the coast; the deck was covered with dew like large rain-drops: a thick fog rose up almost instantaneously, so that we could scarcely see the distance of the ship's length, and were obliged to steer away from the land; but almost as soon as the ship was put about it as suddenly

dispersed. On the morning of the 10th we sighted Albatross rock ; and about two p.m., after a passage of seventy-eight days, cast anchor on the east side of Possession Island, which was our first place of destination. An ominous presentiment overcast our minds when we found thirteen vessels lying at anchor, and taking in cargoes of guano from the island, and the captains of them as well acquainted with the object of the voyage as ourselves.

## CHAPTER II.

First visit to Elizabeth Bay—Natives—Salt spring—Antelopes—Ostrich feathers—Gum plants—Gummiferous cactus?—Succulent geranium—Other plants—Tracts of animals—Minerals—Traffic with the natives—Possession Island—Its composition—Penguins—Mode of dissecting them—Guano—Tanned skins—Seal guano and guano pools—Sponges—Corallines—Third excursion—Stockdale roads—Sponge—Minerals—Perilous voyage to Angra Pequena—Arrival at Marmion Island—Landing in Sheer-water Bay—Walk back—Arrival at Elizabeth Bay—Loss of four men—Minerals, &c., found during the excursion.

*May 12.*—Accompanied by the captain of another vessel, we started in the pinnace upon our first visit to the main land. There is a rock in Elizabeth Bay, bearing about E.N.E. from the anchorage ground, under the lee of which is the usual place of landing. The water is shallow, but the beach is sandy, and the rock affords some shelter from the rollers; there is a probability of being upset, but not much of being drowned. Here, then, we first set our feet upon “poor cursed Africa,” being saluted as we landed by a party of natives, consisting of seven men and two women, with a hearty shake of the hand, accompanied by the familiar words “How do?” “how do?” which were, however, speedily followed up with “Jacket,” “Trouser.” Although they did not get any jackets or trousers, two of them attached themselves to our party, and we found them useful guides and companions. They who were not fortunate enough to be clothed in sailors’ old clothes, had a



mantle of skins (karosse), which being square, was folded after the manner of a shawl, and worn with the fur next the body. They were of middle stature, of an olive-brown complexion, short woolly hair, most of them with none about the face, but one or two with a slight show of beard\* and moustaches; slim in proportion, and straight limbed, with an upright gait, and only a slight tendency to the Hottentot protuberance. Their features bore an expression of mildness, and in all our intercourse we found them perfectly harmless and inoffensive. As I shouldered my musket I could observe that they were at first cautious of getting before me; but this soon wore off, and they became gay and lively. We proceeded in an east-north-east direction over a range of sand-hills, in which we sank up to our ankles; after passing these we came to rugged mountains of granite and gneiss, the sharp scales of which, being separated by the action of the weather, were very destructive to our shoes. At the foot of one of them is a plain, containing a bubbling spring of salt water. Upon our approach four antelopes, of very large size, were returning at their leisure from the spring, and took no notice of the noise of our muskets. As they were nearly a mile distant I could not judge of their species; but from their large size I supposed them to be the Eland of the Cape (*Boselaphus oreas*). We found the natives very useful in collecting ostrich feathers, which the birds had left behind them in the stunted shrubs and plants near the spring. These feathers are generally black and of inferior quality, but a few white ones may also be obtained. The plants are mostly succulent, exceedingly

\* I believe it is customary among them to pluck out the beard.

curious, and many of them unknown to botanists ; only two or three of them were in flower, and these were unfortunately destroyed by one of those accidents common on board a ship, before I had an opportunity of examining them.

One of them has been recently described by Dr. Lindley, in the 'Gardener's Chronicle,' under the name of *Ceradia furcata*, Ichaboe coral bush, natural order *Compositæ* (*Syngenesia necessaria*). It produces a fine transparent white gum resin, which, oozing from the stem, concretes into tears, or trickles down and forms nodules in the sand at the root of the tree : it is insoluble in water and alcohol, burns with an empyreumatic odour, and has all the appearance of copal.

Another plant, having a branched leafless stem, provided with four rows of spines, and a small sessile red flower, somewhat resembling a cactus, but allied, as I am informed, to the genus *Echites* of Thunberg, also produces a curious resin. Whether it be an annual or not I am unable to say ; but many specimens were found in a decaying state, the woody matter of the interior being pulverulent, while the bark was wholly converted into a semi-transparent brownish yellow resin ; the colour of the resin becomes deeper at the lower part of the stem, where that part of the woody matter immediately in contact with the bark is also resinous ; but upon being burnt yields a small quantity of charcoal, in which the structure of the wood remains, which is not the case in the resin of the bark. At the root of the plant, and in the sand, were curiously contorted nodules of the same resin, but of the colour of shellac. The resin of this plant does not exude from the stem in tears, nor is any sap perceptible upon break-

ing it; it is insoluble in water and alcohol, has a vitreous fracture, and is new to commerce.\* Its stem bears a considerable resemblance to that of geranium spinosum, figured in 'A Narrative of Four Journies into the Country of the Hottentots and Caffraria,' by Lieut. W. Paterson, in 1789, p. 116.

These two plants are found in considerable numbers on the coast, in association with a succulent species of geranium, the young bulbs of which are roasted by the natives for food.† If the natives could be prevailed upon to collect the gum, it would be worth the attention of merchants.

Seven species of the genus *Mesembryanthemum* and a species of *Gnaphalium* are interesting to botanists, but possess no mercantile importance.

The water of the spring was nearly of the same composition as sea-water, the saline matter consisting of common salt and some sulphates; it was not, however, so salt as sea-water: the natives, indeed, had no better to quench their thirst; they drank it in our presence, taking it up in the fragment of an ostrich egg, or jerking it from the palms of their hands into their mouth. They carry it from this spring in a leathern bag, to a temporary habitation or kraal which they have on the beach, a distance

\* The remarks of Linnæus are still applicable, at least to this part of Africa: "Semper aliquid novi ex Africa provenire, proverbium tritissimum erat veteribus Romanis, quod ad hunc usque diem satis comprobatur. . . . Nec plantæ minus et arbores heic sunt prodigosæ; sed dolendum quod tam pauci naturæ scrutatores hanc terram penetrare potuerint, et maxima hæc natura miracula detegere."—*Linnæi Flora Capensis*.

† These three plants have found their way from the coast of Africa, and may be seen at the Royal Botanical Gardens, Kew. The *ceratia furcata* and geranium (*Pelagonium crassicauli*) are now beautifully in flower (January), but the cactus (cactus-like) *Echites*, is not likely to flourish.

of more than four miles. The tracks of numerous animals, like footpaths in a field, are seen in all directions, both going to and coming from the spring. Among these foot-marks there were those which resembled the feet of antelopes as large as the ox, zebra, various smaller antelopes, wild dog or wolf, jackal, ostrich, &c. The broken ostrich eggs had been used as drinking cups by a few natives, who, with their chief, called Juncas, had recently been there, and we saw the remains of a sort of inclosure, about two feet in height, of the size of a hut, and formed of the shrubs above described. Near the principal spring was a smaller one, at the bottom of which was a green mud, the detritus of a green slate (horn-blende;) and upon one of our party drinking it he was seized with symptoms of vertigo. This green earth was also found in other parts of the plain, a few inches below its sandy surface. We found likewise red and yellow ochres, salt crystallized, fragments of green jasper passing into bloodstone (*heliotrope*), and white quartz in rhomboids, laying in all directions on the surface, in association with water-worn fragments of arragonite, giving the plain at a distance the appearance of a brilliant white. As far as I could judge this plain was either at or below the level of the sea. On our return to the beach the natives whom we left in the morning were prepared to trade with us; and I exchanged two or three penny rings for a bundle of ostrich feathers, an ostrich egg, and two antelopes' horns. We found that the boat had been damaged by the rollers on the beach during our absence, and upon putting to sea in her, she was so leaky that we could not proceed. With the prospect of being benighted we returned to the beach; but being fortunate enough in

some measure to stop the leak, we ventured again, and by dint of hard rowing, and cutting out the top of a tin canteen for a baling dish, we succeeded in reaching the ship. Thus ended our first day's search after nitrate of soda.

Other minerals found on this excursion were, plates of white mica, carbonate of soda (a small sample given me by the captain who accompanied us, but not seen by myself), compact felspar, hornblende, brown quartz pebbles, sulphuret of iron, ferruginous carbonate of lime, sulphate of lime in crystals (selenite).

The excrement of beasts of prey, perfectly white, mixed with hair and smelling of musk, was seen in different situations, in association with the spine and other bones of antelopes.

I picked up a large insect belonging to the family *orthopterae*, genus *ephippiger*a (species unknown).

One of the horns belonged to the gazelle; the other to a species of antelope, as large as a horse, the eland or impopho of the Cape.

May 14.—This morning we landed at Possession Island, which is in latitude 26 deg. 57 m. S. and longitude 15 deg. 8 m. E. It is about three quarters of a mile in width, nearly three miles in length from north to south, and full that distance from the main land; low and rocky on the west side, about sixty feet in height at the southern extremity, but not so high at the northern: the east side presents a slight incurvation or bay towards its southern third where ships may anchor. A rock, uncovered at low water, stands off near the middle of this side. A reef runs from each extremity of the island, and inclines a little to the main land; plenty of room should be given it in coming in and going out, espe-

cially at the north end. The existence and position of the reefs I have found to be the same in the other African islands which I have visited. The island is composed of a slaty granite (gneiss), of reddish-brown, blue, and green colours, with veins of quartz of an amethystine tinge. Numerous penguins were arranged or marshalled like soldiers at the west side of the island; being unable to fly, they prefer the lowest parts of the rocks, from which they can take readily to the water. Numbers of their eggs were collected every morning; their flavour is rather stronger than that of a duck's egg; their flesh is not palatable: the livers, however, were preferred to salt provisions. I was informed that, by placing one in a net over the ship's stern for twenty-four hours, every part of it would be devoured by the voracity of numerous small fish, leaving only the skeleton and skin.

I took samples of the guano from four different spots; that on the south end, on the high peaks of rocks, consisted of birds' carcasses, dried like mummies, and their skins appeared as if they had been tanned, and were so tough that they could not be torn open without the use of a knife. Inside the body, in the skull, and neck, crystals were found of large size. The guano on the lower parts appeared to consist principally of decayed seals, whose fur and hair were not yet decomposed, and form a considerable portion of the cargo of some of the ships which were loading here. Crystals were also numerous between the folds of the decaying seal-skins. In some of the lowest parts small pools, containing a dark brown fluid, were seen, resembling puddles in the vicinity of a dung-heap after a shower of rain. As the history of guano will be again taken up on a

future occasion, I shall not detain the reader by entering upon it at present.

I picked up, on Possession Island, two species of sponge, both of them friable, and unfit for commercial purposes; a coralline (*tubularia*), a corallina, growing upon a limpet shell, and some specimens of a species of vermetus. These formed the nearest approximations to coral which I met with during the voyage.

*May 15.*—Our damaged pinnace having been repaired, we sailed northwards round the curve of Elizabeth Bay, and beyond its northern point, till we arrived at a rock or island, not laid down in the chart. It is a little more than half way from Possession Island to Angra Pequena, and perhaps ten miles from the former. A brig loading with guano, was lying between this island and the main land, (the distance from one to the other being about the third of a mile,) of which, however, there was not a sufficiency to form a cargo. The brig had entered round the north end of the rock; as it was supposed that there was not sufficient water on the south. The captain recommended us to land in a bay a little to the north-east of the brig, and nearly a mile distant, where we found smooth water, and landed upon a sandy beach by the side of a rock. Much sea-weed, small pieces of sponge, and numerous shells were lying along the beach. There is also a landing-place directly east from this island; but a heavy surf, except in smooth weather, renders it dangerous. We pursued our walk for about four miles eastwards: and our discoveries consisted of an abundance of common salt, situated in valleys, running north and south, and bounded by granite rocks running in a similar direction; these being

passed were succeeded by other valleys, and these again by other rocks. The direction and bearing of these ridges and valleys, is very much the same, as far as I have been enabled to examine, all along the coast. The surface of the valleys was covered with sand, and appeared to be below the level of the sea : and I am of opinion that the salt water makes its way from the ocean percolating through the sand, and between the rocks, and coming to the surface evaporates and leaves the salt in a crystalline state ; the ground being in the same condition as earth newly turned up and frozen. The valleys were surrounded by rocks evidently water-worn ; some of them intersected with veins of white quartz, hornstone, porphyry, and calcareous spar (rhomboidal carbonate of lime.) The rocks themselves consist of granite and gneiss (slaty granite). One of the plains or valleys was surrounded by rocks of a grayish white micaceous slate of a friable texture, which bore well defined marks of the action of water and its detritus was intimately blended with the incrustation of salt, covering the surface of the valley ; in some parts of it salt water still existed. The sun was just hiding himself in the waves, when we returned to the beach, and again put to sea. But when we had got fairly outside the island, our pinnacle would make no way to windward, but lost ground at every tack. With night coming on and a heavy sea rolling, it was deemed advisable to put about and proceed for Angra Pequena, with the chance of finding some vessel at anchor there, which would afford us shelter. After a perilous voyage of three or four hours, during which, scarcely a word was spoken, each being absorbed in his own thoughts and expecting every wave to overwhelm



us, a vessel was fortunately descried, and soon afterwards two others. They proved to be two brigs and a barque. After being hailed by one of the brigs, and mistaken for shipwrecked mariners, we boarded the largest vessel, where we met with such a reception as was to be expected from true British sailors.

We then ascertained that these vessels were anchored at an island or rock formerly called Smith's, but now Marmion Island. It is near Pedestal point, which is a little to the south of Angra Pequena, and so named from a pedestal formerly erected by Admiral Diaz, but now no longer standing. These vessels took what guano could be found on the island; after which they proceeded to the island at Angra Pequena: where they completed their cargoes.

Besides the minerals enumerated above, the following were also found: rolled fragments of green jasper in rhombs and other forms, white and gray semi-transparent flinty slate in quadrilateral tables, (hornstone), large plates of mica (useful for lanterns and stoves) some of them much contorted, fragments of carbonate of lime (arragonite) very hard, fracture like loaf-sugar, water worn on their upper surfaces, their under sides being stained of green and brown colours, reddish brown pebbles, rolled onyx pebbles, rolled pebbles of milk quartz, hornblende. Some of the rocks were brecciated and composed of crystals of hornblende, felspar and quartz, cemented by carbonate of lime; others of mica slate, the mica being much contorted, and in some rocks porphyritic. Granite and very dense green stone, apparently without much felspar, entered into the composition of others.

The following morning in consequence of the continuance of southerly winds, which are most prevalent on this coast, we were in the same predicament as before ; being unable to beat to windward. We were therefore obliged to steer for a bay called Sheer water Bay, whose northern extremity is formed by Pedestal point, and southern by Angra rock, which separates it from Angra Pequena. Here we landed, and the moveable things being taken out of the pinnacle and carried up upon the beach ; she was anchored, and the last of her crew swam on shore. We steered for the south with the wind in our faces, forming a less troublesome guide than our pocket compasses ; the heat of the sun, and the difficulty of the ground we had to traverse rendered the journey extremely harassing. We met with nothing but a continuation of barren rocks (consisting of granite and gneiss containing an abundance of mica) and sandy valleys with here and there extensive salt plains. The valleys were scattered with numerous white quartz pebbles, and appeared as if their solitude had seldom been disturbed by the foot of man, and as if they had recently formed the bed of the ocean. After walking till nearly sunset we directed our course to the beach, in order if possible to ascertain our locality. We expected to have been able to accomplish the whole journey to Possession Island (about forty miles) during the day ; but found to our surprise that we had only reached the place where the brig was at anchor. As it was hazardous to proceed by night in consequence of our fatigue, and the probability of meeting with unwelcome customers in the shape of wild beasts ; we proceeded to the beach, *bent* (as the

sailors have it) a pocket-handkerchief on the top of a ramrod and the ramrod on top of a musket for a signal of distress, were soon afterwards taken on board the brig, and became once more indebted to the hospitality of our fellow-countryman.

The captain informed me that he had given the name of Stockdale Roads to his anchorage ground.

The rock from which he was taking guano is not very likely to be discovered by a ship passing at a distance.

The morning following being somewhat recruited and having renewed our stock of water and provisions, through the kindness of our entertainer; we were landed, and again proceeded southwards for Possession Island. We traversed a similar description of country for many hours. The gum plants and a few other shrubs being the only vegetation which we met with; and these being scattered here and there, were fewer in number as the salt became more abundant. When we arrived at the bottom of Elizabeth Bay, our spirits were revived by the sight of the shipping in the distance. We had still however about six miles to walk round the curve of the bay, before we reached them. The beach is sandy with shoal water, but rocky towards the southern side of the bay. About four p.m. we arrived at the landing-place, where the mate was waiting to receive us, who informed us that not being able to account for our long absence, he had dispatched the gig with the second mate and four men, who had perished in consequence of the upsetting of the boat; the second mate having been washed ashore insensible, was the only survivor, and the boat had not been recovered.

Rest seamen! tho' no coffin but the deep;  
 Nor friends to mourn your fate—nor grave was there!  
 Tho' Heaven hath doomed your ashes long to sleep,  
 Far from your home and kind affection's care.  
 No more your joyful song of "homeward bound!"  
 Shall cheer with echoing glee the listening crew;  
 The love of friends, the ever-gladdening sound  
 Of "welcome home," no more is meant for you.  
 Though little did ye think your hour at hand,  
 The eye that ~~now~~ <sup>never</sup> slumbers, perhaps in love  
 Has marked your bones, now whitening on the sand,  
 And changed your earthly house for one above.

Upon our return to the ship, we were glad to lose  
 the memory of our toils and of our loss in the obli-  
 vion of

"Sleep, that knits up the ravelled sleeve of care,  
 The death of each day's life, sore labour's bath;  
 Balm of hurt minds, great nature's second course,  
 Chief nourisher in life's feast."—*Macbeth*.

The minerals found during this journey were as  
 follow: onyx pebbles; plates of mica; gray tabular  
 hornstone; crystallized arragonite; salt in a variety  
 of forms; rocks of micaceous slate and amethystine  
 quartz; the detritus of these rocks mixed with salt,  
 coarse sand, and carbonate of lime; pulverulent  
 arragonite with minute onyxes; salt containing a  
 carbonate and hornblende; salt of a purer descrip-  
 tion but also carboniferous; opaque green and  
 purple quartz; rolled opaque quartz pebbles; de-  
 composing arragonite; hornblende; gray carboni-  
 ferous slate; chlorite slate; opaque quartz with  
 purple veins.

Found in Elizabeth Bay, clusters of barnacles of  
 a pink colour (unnamed), *donax serra*, *mytilus ungu-*  
*latus*, *purpura trochlea*, *bullia lævissima*, *buccinum*  
*anglicanum*? A tender friable sponge, another  
 species much coarser; cuttle-fish.

### CHAPTER III.

Further examination to the south of Elizabeth Bay—Skull and horns of the gemsbok—Sand-hills—Foot-marks of wild animals—Deserters from our ranks—Minerals—Excursion to the neighbourhood of Wall's Island—Nativekraal—Pipes—Tobacco—Ear-rings—Shoes—Time-keeper—Whalebones—Plain of red ochre—Other minerals—Departure for Angra Pequena—Meteorological remarks—Penguin, seal, and shark islands—Fish, flamingoes, &c.—Samphire—Gum plants—Fresh water—Natives—Minerals—More deserters.

*May 19.*—Our party being increased by the arrival of several other ships on the same errand: we landed again in Elizabeth Bay. Our course on this occasion was directed to the south-east; but three of our number accompanied by the supercargo, referred to in chapter the first, proceeded southwards (the result of whose journey has been already described). We travelled over many miles of the country, which was of much the same character as that to the north of Possession Island. The shrubs however were more numerous, and the salt less abundant, we dug for nitre in several places as we had previously done in our other excursions. In general after getting three feet or less below the surface, we arrived at salt water, and considered it then hopeless to dig deeper. One of our party picked up a fine pair of antelope's horns with the cranium attached; they were nearly straight, or but slightly curved backwards, in the same plane with the forehead, three feet one inch in length; six inches in circumference at their bases, and gradually taper-

ing to a point; provided with nineteen or twenty annuli, which extended for about a third of their length; separated from each other two inches at their bases, and sixteen inches and a half at their apices; the skull was furnished with lacrymal sinuses and had been long bleached in the sun; the animal to which it belonged is called the gemsbok (*antelope oryx*). In one spot we found an excavation containing water, which had evidently been formed by the scratching of wild animals; as the marks of their claws were still visible, and one of them retired at our approach: at nightfall we took up our abode under the lee of a sand-hill. These sand-hills are crescent shaped, being convex towards the wind, and concave in the opposite direction. We collected the shrubs which grew around and made a fire for the night in one of their concavities. When our comrades had completed their arrangements, as the moon "was shining bright and clear," we amused ourselves by tracing the foot prints of wild animals in the sand. We could distinctly observe the tracks of several small species of antelope closely followed by those of beasts of prey, such as we supposed to be jackals and wild dogs. We had no opportunity of getting a good view of any wild animal during our stay on the coast, as their senses of hearing and smelling are so acute that they would seldom permit us during the day time to approach within a mile of them, and never within gun shot; but at night, as on the present occasion they would venture as near to us as our fires would permit: we had wandered so far from our companions that we had a difficulty in finding our way back, and in order to do so were obliged to retrace our own footmarks. After an uneasy night's

rest and many wishes for its approach, we arose at the first blush of morn, to return as usual disappointed of our hope. We proceeded for the beach over sand-hills, which were lofty and extremely fatiguing ; at every step we sank nearly up to our knees, and were consequently obliged to take two hours longer rest before we could get much farther. About two p.m. we arrived at the beach, and returned to the ships : two of our party were so disgusted with this their first and only excursion, that they gave up the search for nitrate of soda, and decided upon loading with guano at Possession Island ; which proved to be, in the sequel, a wise determination.

The following is a list of the minerals, &c., seen or obtained :

Brecciated rocks of felspar, hornblende, quartz, and an abundance of mica, cemented by carbonate of lime ; rocks of mica slate, some of them contorted and porphyritic, others passing into gneiss and chlorite slate ; disintegrating grayish-green slates ; large fragments of whetstone slate ; quartz with felspar (porphyritic quartz rock ?) ; serpentine ; opaque, and brown quartz rhomboids (basalt ?) ; prismatic crystals of arragonite ; hornblende ; common salt.

Among the plants, in addition to those already mentioned, was a leguminous shrub, with leaves like the willow.

*May 23.*—We landed this morning in Elizabeth Bay, and proceeded southwards to the neighbourhood of Wall's Island. After about half an hour's walking we came to the encampment of the natives, if it may so be termed, consisting of a circular space of about seven feet in diameter, surrounded with bushes, two or three feet in height, stuck in the sand, having the embers of a fire in the centre,

around which were sitting four or five wretched-looking women, as many men, and three children. The place was strewn with muscle and limpet shells, which form their chief food. Their first cry was "Water! water!" their second was "Bacca! bacca!" They preferred our tobacco to their own, which is a fine dried grass of an emerald colour. Their pipes are of the shape of cigar tubes, formed of a mottled green or white mineral of the magnesian family, and are carved or roughly ornamented externally. Some of them wore ear-rings, apparently of copper, and of native manufacture; the ring and the drop are of one piece, but I could not learn where they were obtained. Three of the men readily undertook to accompany us, and fetched their shoes, also of native manufacture; the leather appeared as if it had undergone some process of tanning. One of them carried a small piece of cedar wood, neatly formed and bored with seven holes; I observed a string passed through the first hole at starting, which on the following day was shifted to the second hole, so I concluded that it served the purpose of a time-keeper. We found them useful in carrying our water; and had any of us understood their language, much information might probably have been gained from them. We proceeded over a succession of rocks and sandy plains, similar to those before described, till near sunset, when we found ourselves at the bottom of a bay, a little to the north of Wall's Island. Here we encamped; the natives soon made a fire, and stuck bushes in the ground, after their own fashion; after which they roasted some geranium bulbs, which they had collected on the journey for their supper. At the bottom of the bay, in which the water was very shallow, we saw the bones of



whales, a cask, and a box with the word "Chandelles" inscribed upon it, evidently washed away from some French vessel.

The bones of whales are found all along the coast, and in some places have been carried a considerable distance inland, either by wild beasts or unusually heavy rollers.

Upon our return the natives unfolded their mantles of skins, rolled themselves up in them, and slept on the sand as soundly as we should have done on a bed of down.

At daybreak the next morning we walked eastwards for about three miles and a half, when we came to a remarkable plain, which might be four miles in length and one in width, running north and south; bounded at the southern extremity by a small table mountain, on the west by granite rocks, and on the east by hills formed of red oxyde of iron mixed with alumina, and of the colour of rose pink. A solitary specimen of crystallized iron ore (brown hematite) was also picked up. The surface of the plain was covered with brown and yellow ochres, and strewn with red and yellow pebbles and fragments of white quartz. We dug into several parts of the plain, and found beneath the ochre a deposit of sand resting upon the solid granite. Upon our return we met with two or three conical hills, of the same ochreous composition. Our native companions were well satisfied with no other remuneration than their food. When, in addition, they were presented with a brass ring each, they collected as many muscles as we could carry.

The additional minerals brought home were reddish-brown quartz pebbles; grayish-brown rhomboidal scales of hornstone; disintegrating rocks,

composed of carbonate of lime, oxyde of iron, quartz, and hornblende ; disintegrating arragonite ; carboniferous oxyde of iron ; pebbles of green jasper, and yellowish-brown semi-opal, some with green spots ; red siliceous pebbles ; yellowish-brown carboniferous pebbles ; carbonate and sulphate of lime ; common salt.

*May 25.*—This morning our fleet, consisting of five sail, got under weigh, and took their departure for Angra Pequena, leaving behind us fourteen vessels, most of them taking in cargoes of guano. We soon arrived at Angra rock, a little to the north of which we cast anchor, in nine and a half fathoms. The boat which we had left in Sheer Water Bay, was recovered, but in a very damaged condition. In the evening a gust of wind sprang up very suddenly from the east, and the thermometer being taken from inside the cabin to the gangway, rose from 69 to 73 degrees. During our short stay at this place I did not observe any deposit of dew ; but at Possession Island it lay upon the deck live heavy rain drops, and it was scarcely possible to walk about the ship after nightfall without getting wet-footed ; sufficient water might be thus collected from the top of the house to serve the purposes of washing. There are three islands at Angra Pequena, called Penguin Island, Seal Island, and Shark Island ; Seal Island is the northernmost, and Shark Island the most southerly of the three ; none of them are at any great distance from the main land, but Penguin Island is the farthest, lying about a mile from the beach, which is formed by numerous sand-hills. There is plenty of water for ships between them, and a muddy bottom in some places.

A lagoon extends for about six miles under cover

of the islands, at the bottom of which is shallow water, and an abundance of fish, so numerous were they indeed, that one of our party amused us by tucking up his trousers and catching hold of them by the tail, but found them too slippery to be caught in this manner; one taken with a hook and line, and which the sailors called a cape salmon, was covered with spinous scales, and resembled in size and form our own sturgeon; it weighed about 30 lbs. and the flesh was white. We found ourselves much at a loss for a net, as our hooks seldom brought up anything but dog-fish. Enough fish might have been caught had we been supplied with proper apparatus, to have served all the ships' companies. Numerous flamingoes frequented the shores of the lagoon; their pink wings and long slender necks and legs formed a beautiful sight as they flew up in a cloud long before we could get within gunshot. A few pelicans were likewise present, and numerous small birds (plovers) of white plumage and swift runners, whose foot-prints marked the sand at the water's edge, where they were feeding upon worms.

An abundance of samphire grows upon the shore, and the gum trees were more numerous here than I had previously seen them; I am informed that fresh water may be procured about six miles to the north of Angra Pequena, and near the beach; and judging from the appearance of increased vegetation, I suspect that it might, without much difficulty, be obtained at Angra Pequena. As our instructions did not lead us particularly to stop here, I had but one opportunity of examining this interesting part of the country. The natives frequently make their appearance here with ostrich

feathers, and other trifling articles ; but I did not see any of them on the present occasion. We found a considerable quantity of the cactus? converted into gum, as before described ; also veins of calcareous spar in rhomboidal crystals, and an extensive vein of green crystallized hornblende : abundance of salt, both in a pure state and mixed with other substances. Our companions came to the determination of not proceeding further without procuring cargo, and therefore commenced loading with the guano from the islands, which principally consisted of birds' remains. There was very little on Shark Island, which is so near the main land, that it is possible to walk across the rocks from one to the other ; and it was supposed that the birds therefore avoided it, lest they should be surprised by the depredations of wild animals. I left this part of the coast with regret, as I was convinced that it deserved a more particular examination.

#### MINERALS.

Calcareous spar in veins, the crystals in octohedrons and rhomboids. Veins of hornblende passing into chlorite. Rhomboidal quartz and rolled milk quartz pebbles. Aluminous iron ore. Crystallized common salt resting on a brown carbonaceous sand. Detritus of chlorite. Sulphate of lime in the state of a white sand. The islands were of granite, with powerful veins of purple quartz.

## CHAPTER IV.

Arrival at Ichaboe—Crawfish and dogfish—Visit to the island—Penguins—Burial ground—Visit to the main land—Extensive salt plain—Rocks—Banks of shells—Salt—Sulphate of lime—Refraction—Rain—Minerals—Second excursion—Detritus of recent shells—Echini—Wrecks—Whales—Hottentot Bay—First and second excursions and minerals found—Third visit—Extensive vein of iron ore—Archil—Numerous boats—Coloured sand—Native minerals—Fresh arrival—Examination of the north side of the bay—Refraction—Lake—Sand hills—Vibrating sand hills—Leguminous seeds scattered on the sand—Sand containing amethysts—Other minerals.

*May 28.*—We left Angra Pequena this morning and arrived at Ichaboe about half-past three, p. m., here we found eight vessels, most of them taking in guano. Numerous crawfish caught here with a hoop net, baited with the head of a dog-fish, formed an agreeable change in our diet; many young ones were found in the uterus of the dog-fish, and swarm about upon being placed in water; the remains of the egg from which each was found were attached to the umbilical cord; great numbers of these eggs exist in each fish, varying in size from that of a pea to the yolk of a hen's egg, and of the same colour. On the 1st of June, I paid half an hour's visit to the far-famed island of Ichaboe; it consists of a rock of indurated serpentine, the central or highest part may be sixty feet above the level of the sea; the east side is generally perpendicular, and the west side rocky and shelving; immense numbers of pen-

guins were assembled at the west side of the island, and at our approach resembled an army in motion, as far as I could judge there might be 100,000; they were more numerous here than at any other part of the coast which I have seen, great numbers of shags were also congregated with them. The guano appeared as dry as that at Angra Pequena, and much more so than at Possession Island. Some rude tablets of wood marked the last home of several mariners who had died here; but the inscription, which is common at home, "Requiescat in pace!" could scarcely be applied to them; for happening to be interred upon a profitable deposit of guano, they were removed (without the permission of a bishop,) and will probably be removed again. On the 2d, the weather permitting, (which is by no means always the case,) we went on shore on the main land; on our passage we collected several pieces of sponge, which when dry is rotten, harsh, of a friable texture, and therefore unfit for commercial purposes; a close-grained red sponge was also found in small pieces floating on the water.

We landed on the shores of Smooth Water Bay which bears about east from the southern extremity of the island; the beach was sandy and covered with large pieces of the same description of sponge, of which half a boatful might have been collected. A burial-ground is formed a few paces from the shore, where the remains of other seamen repose. We proceeded across hills of granite and conglomerate rocks, till we came to an extensive salt plain about two miles and a half from the beach; this plain was six or seven miles in width, running north and south, and bounded on each side by rocky mountains; those on the west side were of a red

granite, with veins of felspar, white quartz, and porphyry. Those on the eastern side we were unable to examine on this occasion; the length of the plain was greater than the eye could reach, the ocean was seen to the southward from the top of the hills, but no northern termination was visible; we found afterwards that it was continued northwards to Hottentot Bay: upon descending into the plain, we thought we could discern a lake about a mile distant, but upon our approach it disappeared, being caused by refraction, familiarly called mirage; upon digging into the part, however, we found water at one foot and a half in depth, which was very salt and bitter; the plain was as level as the ocean, and its surface covered with an incrustation of salt mixed with sand, it was blistered, and crumbled under the feet like frosty ground; under this incrustation was sand, some of which was of a dirty green colour: at another part of the plain were banks, which at a distance appeared very white; we found them to consist of millions of the shells of two species of bivalves,\* both recent and common to our own coast, their ends were projecting out of the ground, and they were not much decomposed; these banks are on both sides of the plain, equidistant from and parallel to the mountains: they were slightly elevated, and at their feet was another slight elevation of a few yards in width, into which we dug and found masses of salt, of a pure white colour; immediately under the surface and beneath these, a deposit of small white crystals (flattened four-sided prisms with acuminate dihedral summits) which we at first supposed might be the object of our search,

\* *Maetra lutraria*, the same as our own species of that name, and *artemis Africana*, very like our own *artemis linctus*.

nitre, but upon placing them in the mouth they were insoluble and proved to be sulphate of lime. In the centre of the plain and between these banks, we found sand, salt, and a small quantity of these crystals; with these exceptions it was so level that an observation might have been taken with its horizon, the refraction, however, was very great, and the motion of the air very distinct near the surface of the ground; this district appeared as if the sea had but recently left it, the rocks surrounding it are water worn, and the beds of shells still retain the impression of the waves; were it not for the numerous foot marks of persons in search of nitre, one might easily imagine, that at the next tide it would be again covered: while making our researches we were surprised by a slight shower of rain, similar to what in this country would be called "heat drops." A very few stunted shrubs grew here (mesembryanthea:) on our return to the shore we walked over smaller plains, covered with a very coarse sand containing black grains of felspar, mixed with small onyx and quartz pebbles.

#### MINERALS.

Hornblende in a matrix of quartz; green sand; jasper pebbles; gray splintery hornstone; chalcidony; siliceous rhombs of a dark green colour and slaty structure; crystals of arragonite; conglomerate rocks, consisting of brown rhomboidal felspar, quartz and crystals of hornblende, cemented with carbonate of lime; iron ore in a matrix of quartz (brown hematite,) some specimens water worn, others of a green tinge; rhombs of milk quartz; slaty masses with layers of green, brown, red, and yellow colours (gneiss?) sulphate of lime in tables,



transparent and pure (selenite); sulphate of lime in large rhomboidal prisms, with acuminate dihedral summits rising from the acute angles of the prisms.

On the 3d we landed at a different place, about three miles more to the north than on the last excursion, and between two rocks a little to the south of the wreck of a vessel called the Lord Keene. It was a dangerous situation, as two lives had been lost there shortly before; and one of our party on the present occasion landing there subsequently, with a view of burning the wreck, was obliged to remain there three days without water before the weather would permit him again to embark. We pursued a direction to the north-east, and reached a plain which was connected with the great plain just described, being separated from it in parts by ridges of granite rocks. Salt water was found eighteen inches below the surface. At the base of a rock in the centre of this plain was a deposit of shells; some of them belonged to a species of oyster, small and of a pink colour; also the shells of barnacles (of the same species as those before mentioned,) which had become decomposed into a fine yellow powder, inclining to red, were disseminated among them, in association with a univalve shell (ranella argas,) common to the neighbouring sea.

The shells of numerous echini were found along the shore, which was strewed with wrecks, and among them one said to be that of the Guernsey Lily.

Whales of the species called finback, and also right whales, from which black oil is obtained, were daily seen sporting about the reef to the north of Ichaboe, abreast of our anchorage ground.

On the morning of the 4th we left Ichaboe, and set sail for Hottentot Bay, which is not more than eight or nine miles to the northward. We arrived there at two o'clock, P.M., and cast anchor in five and a half fathoms, about three quarters of a mile up the bay. It may be two miles in depth and three in width, and pursues a direction south south-east. The north-eastern side is bounded by a succession of lofty sand hills, and the south-western is rocky and low, but affords good shelter from the prevailing winds. The bottom of the bay is low and sandy, and forms the northern termination of the extensive salt plain at Ichaboe. We landed on the south-west side, under cover of a rock, which is frequently washed by the waves: a few bags of guano might have been procured from it. The landing place, a low sandy beach, is uncovered for some distance at every tide, and the wreck of a vessel lay close to it. There was another landing place right abreast of the ship, between two rocks, and with much deeper water; but when there was any sea the former was preferable. Quartz and onyx pebbles, rather larger than those at the salt plain, were collected among the *billows* of sand, which, like the waves of the sea, had been heaped up by the wind, but retained a more permanent impression. The finer particles of sand were very annoying, penetrating through the clothes and into the hair. Salt water is found by digging three or four feet. The south-west point of Hottentot Bay is very rocky, and seems at one time to have been an island. A few rocks on the beach where we landed were principally of green stone trap, with veins of white quartz. A sample of an earth was also obtained, which consisted of oxyde of iron,

mixed with sulphate of lime, silica, and alumina. One of these rocks with a vein of red sienite, containing golden coloured particles, rather elevated my spirits, and I thought I had discovered a prize; but it proved to be only yellow mica. Water-worn fragments of dolomite (carbonate of lime and magnesia,) some of them tinged of a yellowish brown; also yellowish brown rolled pebbles, honeycombed, and evidently of igneous origin, were some of the minerals picked up upon our first landing.

*June 6.*—This morning we bent our course across the narrow neck of land which forms the south-west boundary of the bay. It is about three miles in breadth, and every step is through waves of dry loose coarse sand, which gives way under the feet. We arrived at the beach of another bay, a little to the south, and towards Ichaboe. It was separated from Hottentot Bay by the rocky point before referred to, and common to the two, it affords no shelter for vessels, on account of its rocks, shallow water, and exposed situation (facing the south-west.) The beach, which is sandy, is between two and three miles in extent. From twenty-five to thirty large boats lay in different situations, all of them high and dry, and in various conditions; some of them being very little damaged. They had been mostly washed away from ships at Ichaboe. This bay also leads into the northern end of the great salt plain at Ichaboe. This plain, seven miles in width, and about twenty in length, was now again examined, but in its south-eastern portion. Large crystals of a dark slate colour, varying in size from one to six inches in length, and some as much as eight and a half inches in circumference, protruded out of the sand, and magnified by the refraction,

at a distance appeared like the tomb-stones in a burial ground. The crystals are rhomboidal prisms, but the summits being eaten away by the action of the salt water, rendered most of them imperfect. They were likewise found in great numbers underneath the surface, not equally diffused, but disposed in patches here and there. In the substance of many of them were the remains of small bivalve shells, from which I conclude that they were crystallized after the shells had been deposited; they consist of hydrated sulphate of lime, coloured with oxyde of iron.

Numerous quartz and onyx pebbles, about the size of nuts, were found at this part of the plain, and the rocks consisted of green jasper, with veins of white, and amethystine quartz. The formation of the sulphate of lime is very interesting. It seems to exist in four conditions; 1st, as alabaster in fragments; 2d, in beds of shells, and under the surface of the sand, in an impalpable powder; 3d, in small crystals of a prismatic form, also in beds of shells; and 4th, in large crystals as above described. The common salt in many parts of the plain, by its evaporation, seems to have clogged up the interstices between the grains of sand, and thus to have prevented the water rising to the surface, which is therefore heaved up and covered with blisters.

On this excursion we were absent ten hours, and walked at least twenty miles.

The remaining minerals found on this journey were as under:—Thin stratum of sand, beneath it a thin stratum of pulverulent brown iron oxyde, covering a stratum of earthy sulphate of lime; some of the ferruginous matter was carboniferous. Gray carboniferous sand, in which the large crystals of

sulphate of lime were deposited; some of it was not carboniferous; micaceous slate, beautifully coloured with green, red and yellow; reddish dark brown carbonaceous iron stone; purple sulphate of lime laminated; felspar in blue quartz; rolled milk quartz pebbles, and semi-transparent hexahedral crystals of quartz; conglomerate rocks, containing hornblende, felspar and quartz, cemented by carboniferous matter; quartz with emerald green veins, dividing it into cubes; fragments of green jasper in rhombs and other forms; compact gray carboniferous limestone; dense slaty masses, which seem to have been fused.

Shells found in the sand of the plain were—the screw shell (*Mesala\* sulcata*,) *ranella argas*. Shells found on the beach: *ranella argas*; corrugated, and other limpets.

*June 7.*—We took an excursion this morning along the rocky shore of the south point of Hottentot Bay, which separates it from the bay described in the early part of the walk yesterday. Tremendous rollers beat upon this coast; their fury never dies; for though the weather was moderate and calm in other situations, it was not so here. Several portions of wreck, spars, and broken boats, lay among the rocks, which consisted of serpentine, with wide and extensive veins of amethystine quartz and peroxyde of iron. The top of one of them was remarkable for the great width of a vein of amethystine quartz, which was cracked all over into masses of a cubical form, and mixed with some felspar. Beneath this was a vein of peroxyde of iron of about six feet in width, which pursued a

\* This and the oyster shells I have not seen on the beach.

direction north and south, and made its appearance in different situations. Its dip was towards the east, but nearly perpendicular. I was strongly desirous of seeing the top of this rock blown off, to ascertain if anything more valuable than iron were to be found underneath. The ore was brown hematite, and the surface of some specimens was botryoidal.

Extensive banks of sea weed, washed up by the rollers, lay among the rocks. Two species of archil lichen grew upon the decaying gum plants; one of them was green, and yielded no colour by treatment with the volatile alkali; the other was yellow, and gave a crimson dye by simple solution in ammonia. Nearly a hundred-weight of the latter was collected by two men in an afternoon; and it is also found in many other parts of the coast.

This shore extended about a mile, and terminated southwards in the sandy beach of the bay described in the excursion of yesterday, and the numerous wrecks of boats were again presented to our view. The sand at the termination of these rocks was coarse, highly polished by the continual attrition of one grain against another, of various colours and different degrees of transparency, some being opalescent, and others perfectly clear. The shades of colour were amber, green and red (from cornelian to ruby,) and they were mixed with finely marked onyxes. Few of them exceeded the size of a pea. They certainly had a very tempting appearance, but were all what lapidaries call "soft stones," and of no value.

On our return to the beach, where some of the ship's company were procuring a few copper bolts from the wreck, we found a native. His stock in

trade consisted of the skin of a wild cat (*Felis Caffra*,) for which I gave him two needles. I also procured from him some native tobacco, and some seeds of the 'Naras. Upon inquiring the use of the latter he made signs that he washed his hands with them (a description of this fruit will be found under Walwich Bay;) he was about thirty years of age, of the same race as those before described (*Namaqua Hottentots*,) and evidently came to trade. Upon his being invited on board, he gave us to understand that he was fearful the ship would carry him away: he appeared to think, however, when his scruples had been removed, and he had embarked, that as a matter of course he should be provided with an outfit; and perceiving a pair of cloth boots lying by the side of the ship's stove, he put them on, and did not seem to consider it any objection that they were much too large. When a cotton pocket handkerchief was shown him, he speedily disposed of it in folds round his head. He eagerly received a small round file, and begged for others. He appeared to be conversant with its use, and pointed to the tube of his pipe. I could not learn from him whence his copper ear-rings were obtained. The native language has many words of a guttural pronunciation, and some Dutch words (as *vrouw*, wife.) He understood enough English to beg, and could ask for "bacca, water, trouser, jacket," &c. Some ends of cigars being laid upon the top of the stove, were speedily disposed of when he thought he was not observed. They are desperate beggars, but this is the only example of pilfering which I have seen. He slept on board, but appeared anxious the next morning to be put ashore, in which he was accordingly gratified, being first rigged outside with

a complete European outfit, and inside with as much as a voracious appetite would permit him to swallow, the rest being placed in a leathern bag which he carried with him. He was slim and active, and imitated accurately and gracefully the steps of the Highland fling.

Minerals found in this excursion :—White opaque rhomboids of carbonate of lime; iron ore in a matrix of quartz (brown hematite, the surface of some specimens was botryoidal;) rolled ferruginous pebbles of brown and yellow colours; ferruginous selenite; blue quartz with felspar; brecciated rocks of green, blue, red, and brown colours, and containing much hornblende; greenish black ferruginous sand, with particles of gold coloured mica.

*June 9.*—Hitherto we had made our excursions alone, but this morning we had the pleasure of an addition to our party, consisting of a brother professional, a captain *and suite*.

As we had carefully examined all the coast, from the head of the bay southwards, we on this occasion bent our course in a different direction, and proceeded northwards, over the extensive ranges of sand-hills which form its north-eastern boundary. As we ascended them the effects of refraction (mirage) were again displayed: the bay, which we had just left, appearing at some distance on the great salt plain, surrounded with its shores, had more the air of enchantment than reality; nothing but sand-hills could be seen in the direction in which we were walking, as far as the eye could reach, except a lake of salt water, which lay beneath, and was surrounded by them. It was separated from the head of the bay, however, only by a bank of sand, which was low and flat, and 300 or 400 yards in width. The



lake was about a mile in circumference, and appeared to have been filled by percolation through this bank. The sand-hills were rather firmer to the feet than those we had been accustomed to, and the elevation causing a greater current of air, made it less fatiguing. Some of them were 300 or 400 feet in height, and their tops slanting like the roof of a barn, this form being produced by the mobility of the sand and the action of the wind; the sides were very steep, and gave way under the feet at every step. The motion of myriads of dry particles of sand over each other, produced in this way, caused a vibrating sound, which was heard by some of our companions at a quarter of a mile distant, and resembled the vibration on board a steamboat when the steam is shut off. A slight stretch of fancy would have induced those on the hill at the time to imagine that the rumbling under their feet would be followed by the shock of an earthquake.

We found a few of the seeds of a leguminous shrub scattered here and there upon this unpromising soil; but as none of the plants were to be seen except at a considerable distance, and as no birds of any kind seem to frequent these desert wastes, we could not account for their deposition. One patch of rocks appeared rising above the sand, of a primitive character, and traversed by veins of iron, with green and manganesian quartz. A red sand, composed of minute amethysts, lay on the beach and side of the hills down which we passed on our return; and walking round the curve of the bay, again arrived at the landing-place.

Among the minerals taken on board were carbonate of lime and magnesia (dolomite), in veins; purple sulphate of lime, in tables; veins of translu-

cent grayish-white hornstone ; brown carboniferous iron ore ; water-worn fragments of green and blue jasper ; greenish-red micaceous slate ; purple, emerald, and blue quartz, in rhombs and other forms ; and rhombs of slaty granite, with gold-coloured mica (basalt ?).

## CHAPTER V.

Departure from Hottentot Bay—Mercury Island—Wreck—Walwich Bay—Bullocks—European establishment—Visit to sand fountain—Vegetation—Buildings—Fresh water—Journey from the Cape—Native chiefs—Articles of trade—Fire-arms—Damaras—Sand plain—Native village—Ophthalmia—Seeds and fruit of the narras—Disgusting mode of feeding—Carbonate of soda—Refraction—Excursion up the lagoon—Plover's nest—Flamingoes—Native parasol—Departure from Walwich Bay.

*June 10.*—As we could discover no indications of nitre at Hottentot Bay, we proceeded farther to the north, and after three hours' sail arrived at Mercury Island, where the two brigs which preceded us cast anchor, entering at the south end. The rocks on the south side of Spencer's Bay are the most lofty which I have seen on the coast, and about 600 feet high; those on the north side are not nearly so elevated. We continued our course along the land as far as Walwich bay, which presented a succession of sand-hills similar to those at Hottentot Bay, (with the exception just described.) The morning following we came to Hallom's Bird Island, where we found a vessel at anchor, and much in want of assistance, to enable her to complete her cargo of guano. Proceeding northwards in about latitude 24 deg. S. we saw a wreck on shore, lying on her beam ends and her lower masts standing. What seemed to be a tent was erected a short dis-

tance to the south of it ; but no sign of any living creature could be distinguished from our mast head. We hauled off the land during the night, and the next morning, about eleven o'clock, saw a vessel at anchor some miles to the eastward, and two other vessels under sail, making for the same place. A very low tract of land appeared to be between us and the vessel at anchor, and proved to be the south point of Walwich Bay, which being thus shut in, might easily be past undiscovered by a vessel at a distance. At two o'clock we made the point, which is very low, runs out for a considerable distance into the sea, and is named Pelican Point ; but the water is tolerably deep close to it. We cast anchor about a mile up the bay, in four fathoms and a half ; the three other ships being a few cables' length nearer to the north-eastern shore. I was glad to see on the beach a drove of bullocks, with some natives and two Europeans attending them ; a tent, with an old ensign flying on the top of it, a haystack by its side, and several water-casks scattered over the sand. These we thought indicated a change from the barrenness and sterility to which we had been so long accustomed.

Walwich Bay is formed by the embouchure of a river, called the Kuisip, which, after extending several miles to the eastward, turns south, and is united to the Orange river. This river flows only once in five years ; its bed is composed of slightly agglutinated micaceous scales of silvery white, green, and yellow colours. Were it not for this natural species of "puddling," the river, when it does flow, would most probably be sucked up by the sandy deserts over which it passes long before it reaches the sea. The shores of the bay, which at the bottom

is divided into two shallow lagoons, are also formed of the same substance. As each ripple of the waves washes up a cloud of these glittering spangles, the observer might easily be tempted to regard them as particles of gold dust.

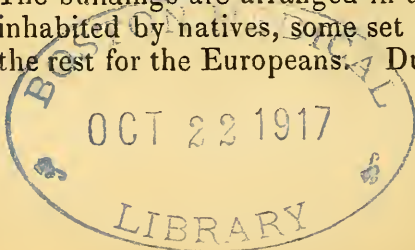
Multitudes of flamingoes, a few pelicans, and numerous plovers, (such as are found at Angra Pequina,) frequent the banks of the lagoons, which are marked by their feet and strewed with their feathers and bones, as also with the scales of the fish which probably compose their food.

Samphire grows abundantly a few paces from the water's edge. There seems to be a great similarity between this bay and the lagoons at Angra Pequena.

We found upon landing that the property on the beach belonged to an European establishment, whose residence is about four miles inland, and who are located here for the purpose of trading with the natives; we were kindly invited to pay them a visit the next morning.

Being provided through the hospitality of our entertainer, one of the proprietors, with a horse, saddle ox, and four donkeys, our motley group consisting of six persons with a Saint Helena donkey boy in the rear, commenced the journey; after passing over a low flat sandy plain one and a half miles in breadth, which forms the immediate bank of the lagoon, we came to some sand hills, and, turning round the point of these, into the dry bed of the river, which was covered with a micaceous kind of clay, composed of minute shining silvery particles, impacted together and laminated after the manner of slate, but very light and easily broken: there was more vegetation in the bed of the river than we had hitherto seen, but it did not extend

beyond its banks ; numerous small trees of a species of fir, stunted and mixed with other shrubs, were flourishing in our path, and in some places obstructed it ; here and there a species of reed sprang up, and a slight show of grass was also to be seen, upon which several goats were endeavouring to obtain a scanty subsistence ; in short, following the windings of this dry river bed, was like proceeding through a wild shrubbery, and though it may seem of little importance to the reader, to us, who had been so long accustomed to barren rocks and sands, it formed a most agreeable change ; after travelling from three and a half to four miles, we came in sight of the farm, or village ; it consisted of four or five rude buildings, the walls composed some of inferior bricks made from the micaceous clay of the river, some of wood, procured from ships, and others of reeds, with which they were also thatched ; this assemblage of dwellings is flanked on three sides by sand-hills, and on the fourth by the shrubbery ; in the centre is a shed, containing a blacksmith's forge, and a short distance from it, a few steps lead down to a well, two or three feet in depth, forming the first repository which we had met with of that precious element—fresh water ; it can also be obtained at many other parts of the bed of the river, but being contaminated with particles of the soil, it is milky, and requires filtration ; in some places it is brackish ; possibly with proper management enough water might be procured here for the supply of ships, but at present it cannot be spared in sufficient quantity. The buildings are arranged in a sort of square, some inhabited by natives, some set apart as stores, and the rest for the Europeans. Ducks, fowls, fine pigs,



goats, asses, bullocks, and young children, were the live stock to be seen in this enclosure. On the sand hills grew a plant called the narras, belonging to the natural order *Cucurbitaciæ*, which is the principal food of the natives. An accurate representation of this plant may be found in the travels of captain Sir J. E. Alexander.

The European dwellings consist of two rooms, separated from each other by partitions of printed calico, and carpeted with furs. A brig belonging to the establishment carried cattle from this place to Saint Helena, but I am informed that this is now discontinued. One of the firm was sufficiently enterprising to travel by land from the Cape of Good Hope, with a numerous family of children; the journey was performed by means of waggons drawn by oxen, and occupied seven months; they encountered many difficulties, and, on one occasion, an ox was taken by a lion from between the waggons; they derived much friendly assistance from native chiefs under whose patronage they are here located, and through whose donation they lay claim to a district of country extending seventy miles inland from the coast, and forty miles in width from the river Swacop, on the north, to the Kuisip on the south; there is plenty of water in the former river, and herbage in its neighbourhood, and most of their cattle are kept there in consequence, but as there is no harbour at its mouth they prefer the neighbourhood of Walwich bay as a residence; the cattle having to be brought so great a distance, and not meeting with sufficient fodder on their arrival, are lean and poor, their flesh is pale, but tender and well-flavoured; five pounds per ox is their established charge to shipping, but they purchase them

of the natives for the value of a cotton pocket handkerchief. The native chiefs named Jan Buys, Juncas, and Amral, make periodical visits to the establishment every two or three months, accompanied by their retinue, and bring with them oxen, sheep, and goats, skins, ivory, and ostrich feathers; for which they take in exchange, tobacco, tea, and coffee, woollen clothes, cotton handkerchiefs, and gown-pieces, looking-glasses, a few articles of cutlery, gunpowder, muskets, beads, trinkets, &c. they would also gladly barter for spirits, but as these have been forbidden by the missionaries resident with the native chiefs, who afford powerful assistance to these European traders, they have been wisely refused. One of these chiefs, Juncas, travels five hundred miles from the south, his residence being near the Orange River. The territories of Jan Buys are in the neighbourhood of Angra Pequena, which would be a more convenient locality for them than Walwich bay. There is a native village, presently to be described, at a short distance from this place, but the inhabitants are represented as very poor, and not in a condition to trade: they manifest a disposition, however, to do so, and as an example I may mention that one of them offered two bullocks to the captain of a vessel, in exchange for a musket; fire-arms are much in requisition among the Namaqua Hottentots, as by their use they are enabled to protect themselves against the incursions of their more powerful neighbours, the Damaras; the latter are said to be an extraordinarily fine race of men, and equal to any regiment in Europe; both they and the Namaquas are engaged almost exclusively in a pastoral life, and their principal riches consist in cattle; they make excellent shep-



herds, but when asked to assist in any other kind of labour they point to the fruit of the narras, and reply that they have enough to eat without work; and the attempts of the Europeans to render the females useful in household work have not hitherto been attended with much success: the native chief, under whose protection the farm is established, is at the head of the Namaquas in this part of the country. Through the interpretation of two persons, one a native, who understands Dutch, and the other born near the Cape, who understands Dutch and English, they are enabled to communicate with the chiefs upon their arrival.

The apt name of Sand Fountain has been given to this abode in the desert.

*June 14.* — We paid another visit early this morning to Sand Fountain, and after breakfast proceeded on donkeys about three miles and a half further up the bed of the Kuisip, to the edge of an extensive barren plain on its left bank, which I was informed was seventy miles in width, frequented by numerous ostriches, but without water or any signs of vegetation; we found numerous transparent quartz pebbles of an amber colour, and crystallized in tetrahedrons, the edges having been partly worn off by the action of water; they lie upon the surface of the sandy plain, beneath which we dug, and at the depth of one foot and a half came to a deposit of brownish-white crystals of sulphate of lime (selenite;) the heat of the sun and the clouds of sand blown in our faces by the wind, rendered our examination anything but pleasant; upon our return we visited the native village, which is situated one mile and a half from the farm, and also in the bed of the river; it consists of about ten huts of a primi-

tive circular form, built of and thatched with reeds, and having slanting roofs, with fifty or sixty natives, including a petty chief or captain, who was dressed in a straw hat, and striped shirt of European manufacture, and buckskin trousers apparently of native manufacture, but of European fashion; he was a young man of unassuming manners, but could beg for "bacca" as well as his subjects; some of them appeared of great age; many of the children were sadly afflicted with ophthalmia, and flies in abundance thronged around their eyes; I attribute this to the reflection of the sun, combined with the clouds of sand which are continually elevated by the winds, I made signs to their parents to wash the diseased eyes with water, but they seemed to have no idea of such a proceeding; they have indeed a method of washing peculiar to themselves; it is as follows, they take a few of the seeds of the narras in the palms of their hands, mix them with saliva, and with the mixture wash their hands and half way up the fore arm; having seen this, I for the first time understood the signs of the native at Hottentot Bay, when I demanded of him the use of the seeds which he had with him; imperfect as this mode of washing must needs be, the part washed became of a lighter colour than the rest of the body; these seeds were exposed in great numbers on the top of their huts to the heat of the sun in order to dry them, and I apprehend in addition to the above uses, that they serve the purposes of food, especially on a journey, being not only palatable but nutritious; the fruit from which they are procured is about the size of a large turnip, of a globular form, and covered with prickles, which is also the case with the stems; the inside of the fruit when ripe is

of a dark orange colour and filled with these seeds, the dissepiments or partitions between the seeds being viscid and stringy have a disagreeably sweet and mawkish flavour, leaving an acrid sensation in the throat; this is very much greater when not ripe, and the fruit is then considered unfit for food. This fruit, water, and a little tobacco, which they earn by assisting in collecting fuel for the use of the farm, is all that the natives require; the females are a squalid race, and those who have borne children have pendulous mammæ, and I am informed sometimes give suck to the infant over their shoulder. During the few days I was at the farm, I saw them on one occasion partaking of the raw entrails of a recently slaughtered ox as described by Morrell; the interior of their huts is filthy and abounding with vermin; a few ostrich feathers and small horns of a species of antelope, which I believe to be those of the reitbok or reed buck (*antelope elæotragus*) were the only articles which they offered for trade. Upon our return to the farm we retired to rest, and I slept for the first time in my life under a coverlid of skins; the howling of a jackal who had ventured to the top of the sand-hills, and was probably looking for a stray goat or kid, and the servants in pursuit of him, alone disturbed our repose. At a place called Rooé Bank, a few miles distant further up the Kuisip were there is more water and grass, two oxen were recently destroyed by the attack of a lion.

*Sunday, June 15.*—I was agreeably surprised by the performance of divine service this day at the farm; at which several of the natives attended, and no doubt more would have been present had there been room to receive them, and an interpreter to

explain to them the meaning of what was read. Walwich Bay would be a convenient position for the formation of a mission to disseminate the truths of religion among the Damaras to the north, as well as among the Namaquas to the south. They seem to have no religion of their own, and therefore there are no idolatrous prejudices to overcome; the natives on the present occasion appeared to consider themselves honoured by being permitted to attend.

*June 17.*—Two of the vessels having sailed for the East Indies and one for the Brazils, we were left to prosecute our researches alone; but this was not long the case, as upon our landing this morning we observed a vessel coming into the bay, which although only a brig, in consequence of the great refraction, appeared like a vessel of 1200 tons; it proved to be one of our old friends whom we had last seen at Angra Pequena; he had been to Mercury Island, where he procured a great number of penguins' eggs, which formed a very agreeable change of diet; on landing for a short time he had brought with him from Spencer's Bay specimens of steatite, titaniferous iron, in a matrix of quartz and hornblende schist; all of them being deposited in veins. He had also picked up a bundle, which was partly covered by the sand, and contained a pistol, two white shirts, a pocket handkerchief, and other articles, evidently the property of a gentleman, but what had become of the owner no one could surmise.\*

As we had heard of a salt of soda of which I was anxious to procure a sample, we mounted our donkeys in the afternoon, and after travelling about

\* They possibly belonged to some person from the wreck, seen by us a few miles to the north of Spencer's Bay.

two miles beyond the farm up the bed of the Kuisip came to the spot where it was deposited, as an efflorescence upon the surface of the river bed in various situations ; at one part, about eighteen inches below the surface there was fresh water. Many oxen had resorted there as a few bones and horns were lying upon the ground, which was also covered with a thin stratum of manure, and on the top of this was the efflorescence in question ; it was found to be an impure sesquicarbonate of soda, containing 23·6 per cent of pure soda, 24·4 carbonic acid, 17 micaceous sand, much common salt, a little sulphate of soda and water.

As our host at the farm was confined to his bed by a severe attack of rheumatism, a prevalent disease on this misty coast, he requested me to remain for the night. On the following morning I proceeded to the beach, in order to examine the samples brought from Spencer's Bay. As I arrived upon the sandy plain forming the shore of the bay, and within two miles of the ships, the refraction caused the appearance of a lake of water between us ; beyond there appeared to be land, upon which the vessels seemed to be resting ; and beyond these the waters of the bay. After breakfast we took boat and rowed as far as the depth of water would permit us towards the bottom of the lagoons forming the head of the bay ; they were separated from each other by a low, flat, sandy plain, about a mile and a half in width. We landed on one side of it, and walked across to the other. The refraction here was also exceedingly curious ; the water in the lagoon towards which we were walking appearing not more than a quarter of a mile from us, we had no idea of the width of the plain ; but as we advanced it re-

ceded to a greater distance, and seemed to be in a different position: numerous lofty sand-hills appeared also here and there, which were shifted in like manner, and those we did reach proved to be nothing more than beds of shells, scarcely, if at all, elevated above the surface of the plain. On one of these a nest was found, composed of fish bones, and containing two eggs, marked like plovers' eggs, but smaller. Finding the distance greater than we anticipated, two of the men were ordered to return, and take the boat to the spot towards which we were walking; as they receded from us towards the water I was surprised to find them growing taller and thinner, till they appeared to be twenty feet high, and resembled a couple of lamp-posts more than human beings. They would occasionally become invisible altogether about the waist, which gave them a most ludicrous appearance. The flickering of the heated air was distinctly visible, and resembled that seen on the top of a hot stove. The magnificent spectacle of 30,000 or 40,000 flamingoes, which were congregated at the water's edge, taking alarm at our approach, and fanning the air with their pink wings glittering in the sun, was truly beautiful. These shy birds were taken somewhat by surprise, through our coming upon them in the rear, and we therefore made a nearer approach to them than usual. They love to frequent the shallow waters of the lagoons upon the coast, in which their long legs and long necks are of most service to them. As far as I was able to ascertain, they feed upon sand-worms or minute fish; the gullet being very small, will not admit anything larger. I slightly wounded one of them in the wing, and upon its taking to the water it was picked up, and became my ship com-

panion for about six weeks, when it died, I believe, from over cramming with pieces of dog-fish. It became perfectly familiar and domesticated; would recognise and follow me about the deck; and when asleep by the side of the cabin fire, with one of its long legs tucked up against the body and the head turned back between the wings, it was amusing to see the bird rolling from side to side with the motion of the ship, in order to maintain its equilibrium. It would drink salt water, but greatly preferred fresh, making a noise in it like a duck. The description of this bird may be found in most works on natural history, and need not be repeated here. I will just observe, that its beak was covered with a very vascular skin, which would bleed upon being scratched; the lower mandible was fixed, and almost entirely filled with a large fleshy tongue, which had processes at its edges resembling a fringe, and was possessed of very little mobility, expulsion, or retraction. The flesh was very delicate, and as white as that of a chicken; the stomach or gizzard and body of the bird were remarkably small.

Another of our party also slightly wounded one of these birds, and as it swam for the land, he jumped over the boat's side and followed it; the chase then became animating. Upon its taking to the water again, it flew up as the boat got within an oar's length of it, when another shot ended the race.\* The beach close to the edge of high water was covered with their feathers, and with those of peli-

\* Both these birds belonged to the species called *Phenicopterus minor*. They are distinguished from the other species with which they were indiscriminately mixed (*Phenicopterus rubor*) by their smaller size and darker-coloured plumage. Those of the latter description were by far the most numerous.

cans. The latter, however, were too shy to allow us to approach them within a long distance.

June 21.—Our host, who was by this time nearly recovered from his attack of rheumatism, presented one of our friends at parting with a curiosity of native manufacture. It consisted of a parasol, which had belonged to the lady of the chief, or queen. It was formed of numerous black ostrich feathers, arranged in a circle, and tied by the quills round the end of a stick, which was rough as it came from the tree; the convex surface of the feathers was downwards.

As Walwich Bay is an alluvial district, the minerals are few in number, and have been already enumerated. In consequence of the quantity of sand, no rocks whatever are to be seen.

Among the shells were a small and handsome species of buccinum (unnamed), buccinum cuvieri, and marginella adansonii, a species of pholas, and the psammobia maculosa.

The bones of whales had been very abundant in the bay, and fragments of them strewed the beach; a large quantity of them had been removed on board a vessel. Numerous averdavats (*Estrilda astrild*), and a few white crows and doves, nestle in the shrubbery. Among the insects was a species of Bradyporus, in a pupa state.



## CHAPTER VI.

General remarks upon the coast—Geology, &c.—Fresh water—Best mode of travelling—Oxen—Parts worthy of exploration—Orange river; copper ore and other valuables there found—Plain said to be covered with nitre—Natives—Articles of trade—Mode of fitting a schooner for exploration—Whale and decked boats—Guano on Olefant rock and perhaps on other rocks—Rollers—Barometer—Chronometer—Refraction—Latitude—Sesqui-carbonate of soda.

BEFORE leaving the African continent, a few observations of a general nature will, perhaps, be acceptable.

Having been informed that nitre existed at certain definite spots in great abundance, the owners of ships dispatched them forthwith, provided only with such gear as would be necessary to load; some vessels, indeed, arrived with the expectation of finding their predecessors loaded, and of reaping the benefit of the stage from which they had taken in cargo. Only a few vessels carried a scientific person, and still fewer received general instructions to search the coast; the latter class, indeed, consisted of masters who were part owners, and having a stake in the adventure, more reliance was placed upon them.

The geology of the coast is described in few words: it consists of an extensive primary and transition district, in some situations mixed with the earlier secondary rocks, gneiss and mica slate. The

primary mountains are composed of several varieties of granite, which in many places is scaling away or in a state of disintegration. It is intersected in all directions with an immense number of veins, mostly of that description called barren veins by miners: these require careful examination; but it is impossible to dig up these iron hills with a walking-stick, or to look at them properly at one visit, especially when that is a hurried one, and in search of nitres. The rocks and veins are of that description which in other countries abound in metallic riches. Manganese, chrome, and iron are the metals which impregnate the rocks. Copper ore, I was informed, had been found at Angras Juntas; but I am uncertain of the truth in this respect. The rocks are generally water-worn, and evidence that the sea at no great distance of time covered a much greater extent of the coast than it now does. Shells, differing very little, if at all, from those now living on the beach, were found at the salt plain at Ichaboe, covered by a bed of sand. The sea is still receding from the coast, which I attribute to the drifting of sand towards the shore during the prevalence of easterly winds; this being driven in a contrary direction by rollers from the south-west, is heaped up on the beach, and forms a barrier, beyond which the sea cannot pass, although it percolates through it in many places, and gives rise to the formation of salt plains. In this way the shore, for many miles together, will often present nothing but a continuous range of sand-hills. There are probably internal deserts of great extent in the same latitude. I went to the edge of a sand plain at Walwich Bay, which was said to extend seventy miles inland.

The existence of sesqui-carbonate of soda in the

dry bed of the Kuisip is a curious circumstance; and whether this product has been formed on the spot or brought by the river from a soda lake in the interior is worthy of further inquiry. I saw no specimens of it crystallized. Among the alluvial deposits that of sulphate of lime in Ichaboe salt plain is particularly curious, and the manner in which the crystals were eaten away by the action of salt water worthy the attention of chemists.

The rocks in the district between Possession Island and Angra Pequena abounded in granite, gneiss, mica slate, chlorite slate, and clay slate. Those in the neighbourhood of Ichaboe and Hottentot Bay belonged mostly to the trap formation. Among them the large quantity of green stone trap, and the brecciated rocks, consisting of hornblende, quartz, and common felspar, cemented by carbonaceous matter, were remarkable. The seemingly uniform, north and south direction of the valleys and ridges of rock is a curious circumstance. Whether the rocks have been thus worn in former ages by currents similar to those now in existence is a subject for geological speculation.\* I feel bound to contradict the assertion in Morrell's book, respecting the abundance of coral and fine shells to be found along the coast. I did not meet with a single species of coral during the voyage; the nearest approach to it being a vermetus, a species of tubularia, a corallina, and two species of sponge found at Possession Island. The shells have no commercial value, and but little interest even to the naturalist. The

\* "The most extensive and best determined system of currents is that which has its source in the Indian Ocean under the influence of the Trade winds; and which after doubling the Cape of Good Hope inclines to the northwards along the western coast of Africa," &c.—Lyell's *Geology*; vol. 2, p. 26.

plants chiefly consist of individuals belonging to the genera mesembryanthemum, gnaphalium, geranium, and the gum-bearing plants before referred to. The numerous antelopes frequenting this part of Africa derive their subsistence therefore from plants of these genera.

Of insects, I have not been fortunate enough to obtain more than two or three, and these are of hitherto unknown species ; they belong to the orders orthopteræ and crustaceæ, and genera bradyporus, ephippigera, and sphæroma. These and the plants which are new in this country being more adapted for works purely scientific, I shall describe more particularly on a future occasion.

It is a formidable undertaking to explore this part of Africa, on account of the difficulty of procuring fresh water, which is only to be obtained at certain localities ; of these, Walwich Bay has been already described. At Sandwich harbour there is also fresh water, and the passage into it is deep enough for large ships) ; in this respect Morrell is likewise in error). At Angra Pequena I think water might also be procured. All these places are frequented by natives, who are disposed to trade. The necessity of carrying water, provisions, &c., together with the heat of the climate and the nature of the ground render it impossible for men to proceed on foot any great distance. Oxen and asses are better modes of conveyance, and an ox waggon the best : oxen procured on the coast or at the cape are preferable to those taken from home, as being natives of the climate. This mode of travelling was adopted by the Europeans at Walwich Bay. The long period of seven months expended by them in their journey from the cape, a distance not exceeding twelve deg. of latitude will give some idea of the difficulty

of travelling. From twelve to sixteen oxen attached to a waggon and attended by native drivers will in this way proceed about twenty or thirty miles a day. Saddle and pack oxen are more convenient, as the choice of the way is not then so difficult. These animals are used by the native chiefs when they bring their goods from a distance to Walwich Bay, for the purposes of trade. The locality which I think might be conveniently explored extends from the Kuisip or Swacop at Walwich Bay, on the north to the Orange river on the south; a branch of the latter river, it is said, passes several miles to the eastward from its mouth and then turns north, pursuing a direction parallel to the coast, and unites with the Kuisip or Swacop. A bar at its mouth prevents the entrance of vessels, and renders difficult the passage of boats;\* but when passed, I am told, there is plenty of water. The Europeans at Walwich Bay informed me that during their journey from the cape they arrived at an extensive plain in the vicinity of this river, which appeared to consist of nitre. I give the information as I received it, but cannot be responsible for its correctness; it was supposed to be about forty miles from the sea. I think, however, that nitre is more likely to be found at this distance than in the immediate vicinity of the coast.† Explorations

\* This is the *opinion* of sea-faring men: Captain Sir J. E. Alexander states, "I saw no rocks or dangers here, nor did I hear of any rocks from the natives in or about the mouth; there is probably a shoal of sand outside, but with care it seemed that the mouth of the river could be entered by a schooner." Expedition, &c. vol. 1st, p. 116.

† It was asserted by the captain of one of the vessels during the present voyage, that nitre did exist in the direction of Elizabeth Bay, but it was more than forty miles from the sea. "Nitrate of potash is found at the Cape of Good Hope."—Phillips's Mineralogy, 2d edition, vol. 1, p. 147.

might perhaps be conveniently made along the course of the Orange river, and from it towards the coast as well as from the coast towards the river. A native interpreter, who, I presume, might be obtained at the Cape, would be a desirable companion. No opposition need be apprehended from the chiefs, but rather encouragement, provided they are satisfied that the objects of the travellers are not inconsistent with their interest. They are much alarmed lest their rival neighbours, the Damaras, should come into the possession of fire-arms; but when satisfied upon this point, there seems to be no danger of personal violence in travelling through their country. Two or three missionaries, I believe are stationed amongst them, and it would be desirable to carry letters of recommendation to them. The natives manifest anything but a repugnance to an intercourse with Europeans. Upon our taking to the boats at Elizabeth Bay and other places, after a day's excursion, they would assist in pushing them off, and then jump in themselves with the exclamation 'ship! ship!' and it was with difficulty that they could be got out. It seems that they had been so well treated on board the ships that they eagerly embraced an opportunity of revisiting them: one of them was so enamoured of a sea-faring life that he left home and friends, and I found him on board a vessel at St. Helena, on his passage to England, apparently well contented with his lot, and with his new name of Ichaboe John; he had been regularly entered into the list of the ship's company, and had signed articles with 'his mark.' This man was about forty years of age. He much amused me with a dance, performed on the knees, and accompanied by the

noise of two sticks hammered one against the other, and with the exclamations, " he, he, he, ah, ah, he, he !" &c.

Should an expedition to this part of the coast terminate in the finding of a deposit of metal sufficiently valuable to induce the formation of an establishment on the spot, many articles of trade valuable in this country might be superadded through the instrumentality of the natives.\* Ostrich feathers, though generally black and of inferior quality, are accompanied by some fine ones, and may be picked up in abundance in the plains or valleys along the coast. The copal plant grows generally in most parts that I have visited, and though not in sufficient abundance to pay the expenses of collection by a ship's company, might be obtained from the natives on reasonable terms, and perhaps might be cultivated in large tracts with

\* " I now made by means of the old Bastard, William Joseph, the interesting discovery of a large mass of copper which exists about sixty miles E.S.E. of Aris, and about twenty miles from the south bank of the Orange river. This copper is quite accessible, and might be either smelted on the spot with Orange river wood, of which, as I have said before, there is plenty : or the ore might be floated down to the mouth on rafts, which rafts might then be sawn up and sent to the Cape, where wood is always in great demand for building : or the ore might be transported in waggons to the sea, and shipped from Cape Voltas or the mouth of the great river."

" The son of William Joseph was hunting in 1834, when he came to a spot abounding with green stones, and following the direction of these he found masses of green rock ; he brought home pieces of this, and on melting them a blue flame arose, and bright copper ran in the fire, from which bullets were cast." . . " I brought away a quantity of this ore from the river which was assayed by Sir John Herschel at the Cape, and from a picked specimen, 65 per cent. of metal was returned. Another specimen taken at random from others yielded 28 per cent. in London. Now the richest of the South American mines yields only 25."—Expedition, &c. Capt. Sir J. E. Alexander, pp. 117, 118, vol. 1.

The richest specimen was a chloride ; That yielding 28 per cent. contained 4 of sulphur.

proper management. Various species of lichen, valuable in dyeing, are found in different situations: large plants of mica, useful for lanterns, stoves, &c. might, with a little care be obtained from the rocks in great abundance; and to these may be added, ivory, skins, hides, &c. The coast north of the Swacop presents a wide field for discovery, even as far north as St. Philip de Benguela, and is still open to the enterprising.

I have before remarked that a schooner is best adapted for the purpose of coasting. She should be provided with proper boats: a whale boat, if attended by a crew accustomed to her management, will often enable parties to land in situations where the surf or rollers would otherwise render it impracticable. Proceeding for any distance along the coast in an open boat is attended with great risk to life and property. In addition to our own loss of four men, at Elizabeth Bay, a schooner spoke us at Hallom's Bird Island, the captain of which, with four of the crew, had perished in an open boat while endeavouring to discover the spot described in Morrell's work as Ogden's Harbour; a decked boat, therefore, is very useful,—by means of it discoveries might be made of rocks or small islands containing deposits of guano which have escaped observation altogether, in consequence of the necessity of ships keeping at a respectful distance from the land.\* We were informed by a vessel

\* I now ascertained the existence of two new objects of interest on the map; the first is a small but productive seal island, between Orange River and the Kowsie, or Buffalo River, (the last the boundary of the colony). . . . In the end of 1835, two traders, (Eddington and Kennedy) with the assistance of the Namaquas, had got between four and five hundred seal skins off the Island. . . . The next discovery of



which spoke us near Hallom's Bird Island, that there were five or six cargoes of guano on Olifant Rock, in False Bay, north of the Cape; but that it was difficult to get off:—surely not more difficult than from Hallom's Bird Island.

Two or three Cornish miners among the crew would be valuable acquisitions.

A quantity of gunpowder, chemicals, and apparatus containing a small forge, with a glass-blower's lamp attached, and a daguerotype or calotype apparatus, by means of which, merchants at home would obtain accurate and faithful representations of interesting views or natural objects, would be desirable adjuncts under the directions of a scientific man; other philosophical instruments, such as a good microscope, &c., would be very useful.

Sandwich Harbour, Mercury Island, and Angra Pequena, I consider worthy of particular attention; and also Angras Juntas, and the Orange River; but the whole coast is worthy of a more careful survey, and therefore the instructions should only be of a general character.\*

importance in this neighbourhood which I shall now notice is that of a new bay, called Rooe (red) Wall Bay, about forty miles to the south of the Zwartlinjes (black ribbon) River, and close to the mouth of the Spook (or ghost) River."—Expedition, &c. Captain Sir J. E. Alexander, vol. 1, pp. 55, 56.

\* "That there will be white men settling on the banks of the Orange River at no distant day I have little doubt; for I found at convenient distances from the river, great store of valuable iron and copper ores, for which there is always a great and increasing demand in Europe.

"Their accessibility is their great recommendation here; also their being placed in a dry and healthy climate, and amongst tribes who can easily be conciliated with small presents, and who might even be tempted to assist in working the mines. But, besides the ores, we know to exist near the river, the timber is very valuable, and I found abundance of ebony. Gum might also be collected in any quantity from the acacias along the river, sufficient I should think for the consumption of England: and bees' wax could also be procured in great

The prevailing winds being southerly, it is very easy to get to the north ; a gentle north wind however occurs, about the time of the rollers, which make their appearance from the south-west and are often unattended by any wind ; they are prevalent at new and full moon, or when she is in perigee ; I have observed, that if accompanied by fogs they are of a more moderate character.

The barometer does not vary much, seldom more than two tenths beyond thirty ; but the nature of the variation is precisely opposite to what it is in the northern hemisphere, viz., it rises in bad weather and falls in fine weather ; during the heavy gale in which we were blown away at Hallom's Bird Island, it *rose* only to thirty and two-tenths.

Chronometers are very liable to get out of order during a residence of any duration upon the coast ; that with which we were provided, though correct upon our first arrival, when we reached Saint Helena, was found to be 6 min. 23 sec. in error ; I have also heard similar accounts of other ship's chronometers.

Neither can any greater dependance be placed upon observations, in consequence of the great and varying refraction, to which many allusions have already been made ; I have seen the upper limb of the sun when about to set become suddenly flat, and after descending through a stratum of vapour resume its form, which however it would again alter before getting much lower. By repeated observation on the latitude of Hallom's Bird Island, we found Morrell's account nearest the truth, viz., 24' 38" S.

abundance along the river."—Expedition of discovery into the interior of Africa, &c., by Captain Sir J. E. Alexander, vol. I, p. 108. The iron was meteoric and contained about four per cent. of nickel.

Of the other parts of the coast so far as I have been able to judge, the admiralty charts are just sufficiently correct for purposes of navigation. But without doubt much of it requires to be better surveyed, many bays and small islands not being marked in the charts at all, as Hottentot Bay.\*

As a starting point, for further researches in the neighbourhood of Walwich Bay, especially to the northward, which I believe has not hitherto been examined by any European traveller, an establishment for the concentration and purification of the sesqui-carbonate of soda might be formed; I found this substance covering an area of many acres, but I have little doubt of its existence in much larger quantity in the immediate neighbourhood; not many years ago this alkali was worth 45*l.* per ton, but in consequence of improved chemical processes, it is now manufactured in large quantities from common salt, and is therefore considerably deteriorated in value. In its present state, the sample which I brought home may perhaps be rated at no more than 4*l.* or 5*l.* per ton; but by concentration it might be made to produce 10*l.* or 12*l.*, or perhaps more, depending upon the state of the market.

\* The vessel wrecked in Hottentot Bay is said to have been in consequence of its having been mistaken for the passage between Ichaboe and the main land.

## CHAPTER VII.

Search for guano—Refraction—Arrival at Hallow's Bird Island—Its description—Alligator rocks—Nature of the coast—Difficulty of landing on the island—Bad anchorage—Apparatus for getting off the guano—Sheers, jackstay, &c.—Mode of ascent and descent—Structure and size of the island.

OUR instructions not leading us further in search of nitre, we had next to look for guano; and the nearest deposit of this substance being at Hollam's Bird Island, where we had been previously invited to stop by the vessel at anchor; our course was bent thitherwards.

We got under weigh about one o'clock, p. m., one of our companions having preceded us a few hours; about four o'clock we saw a vessel coming from the southwards, which loomed like a ship of a thousand tons, the masts and sails appearing to be of an astonishing height; as we approached nearer her hull became invisible; and upon looking at her shortly afterwards, the hull and sails could both be seen; but there was a space between them close to the deck which could not be seen, and gave the sails and masts an appearance of flying in mid-air, without any attachment to the vessel. She grew smaller as she approached instead of larger, and proved to be a schooner. The magnifying power of the air seems to be principally exerted in a vertical direction, and is extremely curious.

After beating about for four days and nights, during which we were far to the westward, and our predecessor in the race for Hollam's Bird Island, had gone past it to within sight of Mercury Island and returned, we arrived at our place of destination and found him at anchor there, with the vessel which had hailed us on a previous occasion.

Hollam's Bird Island, being of a white or light brown colour and not very high, is invisible at any great distance on the ocean, even in clear weather; and in fogs, which are very prevalent in its vicinity, it is of course very liable to be passed altogether: under favorable circumstances it may be seen at a distance of ten miles. Judging by the eye it is about nine miles from the mainland. There is always a surf upon its western side where the rocks are shelving; but there is plenty of water all round it in moderate weather within two or three cables' length. A reef runs a short distance from its north and south points, especially the latter, inclining, like those of Ichaboe and Possession Island towards the shore. The best anchorage, if there be any choice at a rock in the midst of the ocean, is on its eastern side, when it bears from west to south-south-west. From eight to fourteen fathoms is the general depth of water with rocky bottom. The whole scope of the cable is necessary, and a very heavy anchor. Two rocks uncovered with water and generally surrounded with birds, are separated from its southern extremity by gulley-ways, through which the sea continually rushes with great force. There are other rocks under the water, of which three are visible on its eastern side and two near its northern point. Having sailed in all directions round the island in consequence of being driven from our anchors on

three separate occasions, I have never seen anything like reefs or shoals in its neighbourhood: and although it was reported, on our first arrival here from the south with a strong breeze, when about three hours' sail S. S. W. from the island, that the ship narrowly escaped a reef called the Alligator rocks, the supposed source of danger was never seen afterwards. The shore of the mainland, as far as I have been able to observe on different occasions, is generally rocky and low at the water's edge; but covered with sand in other situations; forming an elevated and mountainous range of sandhills which have most probably a rocky base: a black rock, bearing about east-north-east from the island, forms a remarkable exception to this description, and may be distinguished at a considerable distance; it seems to form one of the points of a bay, but this appearance will materially alter in different states of the weather. The prevalence of fogs renders the land often altogether invisible, and the refraction of the atmosphere will not allow the evidence of the eyesight to be depended upon at any considerable distance. It is said that there is a rise of six feet in the tides. It is impossible to land upon this island except during a perfect calm, and then only on some low rocks about the junction of the southern and middle thirds of its eastern side; as there is always a swell and breakers setting in on the west. The first ship which arrived here for guano was at anchor one month before a landing could be effected, and perhaps would not have succeeded then had not the services of a whale boat been put in requisition: in consideration of this important assistance, the whale ship, which with several others had arrived in the

interim, was loaded in a few days by their united efforts and took the first cargo of guano from the island. The bottom being rocky the anchorage is very bad, as there is no holding during a gale of wind, unless the anchor should happen to catch on the point of a rock : several ships attempting to load here have been blown away from their anchors and some have never returned : one of these I am informed had paid for her cargo but was obliged to leave most of it behind her ; indeed only three or four vessels have succeeded in obtaining full cargoes from this spot.

After a landing had been effected the next object was to get the guano off ; but this is no easy matter at Hollam's Bird Island, and no mean share of ingenuity was displayed in the contrivance invented for the purpose. Four spars were lashed together near their summits and erected near the edge of the cliff about the middle of its eastern side ; over the top was drawn a stout hawser, 120 fathoms in length, made fast by tackling at one extremity to a rock on the island, and at the other to an anchor and small cable, that part of the hawser which was under water being buoyed by a water-cask to prevent its chaffing against the rocks. Any degree of tightness could be obtained by means of the tackling on the island. This arrangement of spars was called the sheers, and the hawser just described the jackstay. Another rope called the travelling jackstay was made fast at one end to the hawser a few feet above the water, and passing upwards over a block suspended from the lashing of the spars then descended and was twisted round the barrel of a winch which was attached between two of the spars or sheer legs ; by

means of the winch handles the travelling jackstay could be made tight or let go at pleasure, and thus receive any elevation required.

On the travelling jackstay was placed a block which had free motion, to this block was attached a small rope called a tracking line, which passing round another block at the foot of one of the sheer legs could be made fast round a peg, so as to regulate its velocity when descending, or be carried by hand across the island when ascending. The guano having been previously tied in bags and piled upon a stage of planking close to the edge of the cliff, was made fast by a noose and suspended to the hook of the block on the travelling jackstay by two or three bags at a time, the winch was then set in motion and the travelling jackstay made tight; when the bags had by this means received a sufficient elevation, the tracking line was let go, and the bags descended by their momentum. The boat being moored to a surf line attached round the hawser near the water's edge, and round the spars which supported the stage on the island, was ready to receive the suspended bags, and the word being given the winch handles were let go, and the bags descended into the boat. The tracking line and block were then drawn up again by hand, and if any provisions were required, or passengers visited the island, they must be conveyed in the same way. This is the best description which I can give of the apparatus necessary to take off the guano, after it had received some improvements from our ship's company, one of which consisted in the substitution of eight sheer legs instead of four, in consequence of their having been blown down one night in a breeze of wind. The chaffing through of the hawser



and the dragging of the anchor were also difficulties which had to be encountered. A tent for the use of the men on the island completed the arrangements required.

Seated upon a couple of guano bags, we ascended by this novel and frail support. Two of the captains who followed, upon setting foot on terra firma were politely informed that the fee for their conveyance was a gallon of "grog" each, this being the usual perquisite in the guano trade. Should any demur be made to this request, it may possibly be intimated to the offending party that he will go down with a run.\* About the middle of the east side of the island there is a spot where the rollers which come round the north and south ends meet and neutralize each other. It was in this place that the jackstay was anchored and the boats took in cargo. Should there be any sea, however, it is not possible to work the boats; for even when there is but a slight roll, the boiling waters dash against the cliff, and leap as high as the sheers'-head. This continual bombardment of the cliff on the east side has made it perpendicular, or rather has worn it hollow, and made it lean over. The other parts of the island being shelving, the rollers wash over

\* There was much of this sort of interruption during the *flourishing* times at Ichaboe, when there were about 5000 persons on the island, and a man-of-war in attendance to keep them in order. A refractory captain would then be in a fair way of being "*penguined*," id. est, pelted with dead penguins; or if they were not at hand, he might possibly be "*bonneted*." It did not matter whether he landed in his working dress or "*a la mode*." One of the gentlemen of the latter description, when saluted with the customary greeting of "*penguin him!*" "*penguin him!*" very deliberately pulled off his coat, and offered full, fair, and ample satisfaction to all comers. He was afterwards treated with respect. This disorderly spirit became in the end so great, that no one was permitted, through the intervention of the man-of-war, to remain on the island during the night.

nearly the whole of it. The highest part was first chosen for the erection of a tent; but the roller putting the fire out, it was removed to a spot a little more to the south, which is the only situation not reached by them. The highest part is the north-east point, and it diminishes towards the south-west side.

This island or rock consists of a reddish-brown granite, intersected with veins of white and semi-transparent amethystine quartz, running north and south. It approaches the triangular form, the base being towards the east, about 85 fathoms in length, the south-west side 80 fathoms, and the remaining side, towards the north-west, measuring 75 fathoms. Its surface is very irregular, craggy, and intersected by gullies and pools, in which the water lodges when flooded by the rollers. Not a vestige of soil or vegetation is to be found. The highest part of it is 65 feet from the water's edge, and where the sheers were erected about 45 feet. The action of the guano upon the rocks has rendered them in many places as smooth as glass, and has so altered their colour that they present on the surface shades varying from white to dark-brown.

## CHAPTER VIII.

Natural history of Hollam's Bird Island—Penguin—Shag—Seal—Gannet  
—Sea-gull—Cape pigeons—Albatross—Cape hen—Whales—Thrasher  
—Sea anemone—Shells.

BEFORE entering upon the natural history of guano, of which I have acquired new and important views during this voyage, it will be necessary to give some account of that part of the animated creation indigenous to this and the other African guano islands, which I have had an opportunity of observing. These consist of penguins, gannets, shags, seals, sea-gulls, a few Cape pigeons, and plovers.

### THE PENGUIN. (*Spheniscus demersus*.)

The jackass penguins, so named from the exact resemblance of their cry to the braying of an ass, appear at a distance like soldiers marshalled in ranks; they stand nearly erect and close together upon the rocks, near the water's edge, so that they may be ready to take to that element in case of alarm. They are not very expert in the use of the legs; but much more so in the use of the bill. Not being provided with wings, but with flippers, when pursued at some distance from the water they are unable to escape. As soon as they find this to be the case, they turn like courageous warriors to the combat; they do not attempt to alarm their opponents with sound of trumpet, but they display their anger by braying; and should the

most prominent part of one's face be within their reach, they spring up at it without further ceremony. It is no unusual thing for them to bite a piece out of the hand, if they have an opportunity, and for this their bill is admirably adapted. It is of a dark-brown colour, striated longitudinally towards the base, the upper mandible provided with a hooked process at its extremity, and a groove along its edges, bounded by sharp ridges, which fit into a corresponding depression and groove in the lower mandible, so that they would have little difficulty in biting a fish in half. They are covered with feathers, which have some analogy to fur; those on the back are black or dark brown, dotted with spots of a dull green, and near the tail with a white spot. Those on the front of the body are of a beautiful silvery white (sometimes dotted with a few black spots), and marked with a band of black, which passes from the lower part of the leg upwards in front of the flippers, across the neck, and downwards in like manner on the other side. This band is separated from the black feathers of the back by another band of white, which runs parallel to it. These bands give them at a distance the uniform appearance of a regiment of soldiers, as before mentioned. A black tuft is seen at the base of the inferior mandible. The flippers are somewhat of the shape of wings without feathers, but covered with a tough membranous integument, which is provided with feathery scales. The bones of the flippers are numerous, and very complicated. From the point of the bill to the base of the tail they measure about 2 ft. 2 in., and about 1 ft. 4 in. in circumference. I have a skin, which being dried and somewhat stretched, covers an area of  $2\frac{1}{4}$  square feet. Under the skin

is a thick layer of fat, which is with difficulty separated from it, and is analogous to the blubber of seals. Their feet are strong, webbed, and furnished with three long and one short claws. With their flippers they give a blow sufficient to induce any one to set them at liberty; their principal use, however, is under water, where they move with greatest velocity, like a fish; indeed with much more speed than on the surface. They are fond of prowling about in the dark, and some of them would occasionally enter the tent during the night, and should any of the sailors unwittingly leave his bed at the time, he was in a fair way to pay for his temerity by the loss of his hide. One of the Jacks, when inclined to mischief, would amuse himself by catching a penguin by the leg, and blowing out the light, throw him into the midst of his slumbering companions; they were not permitted long to indulge their repose, and as their mattresses lay side by side, the poor penguin was hustled from one to the other, and thus had an opportunity of dispensing his favours without partiality. Favoured by darkness, the only way for the sailors to escape the gripes of their adversary was to beat a retreat, leaving the penguin master of the field. This and another trick of this same Jack, viz. that of putting gunpowder in the tinder-box, which nearly blew the cook's nose off when he struck a light in the morning, afforded me much amusement. Several penguins being brought on board were put into the long boat, and during the night would get up on the thwarts, and leaping down upon deck, take a survey of the cabin; if any one caught them by the legs they would begin to bray, shake their flippers, and put themselves into a violent passion at the audacity of their capturers.

Some of them were extraordinarily fat, and weighed from six to twelve pounds. Nearly all escaped at St. Helena, and the remainder at Ascension ; but what surprised me most was, that although on board for a month, they took no food during that time, and notwithstanding were as bold and active as ever ; the only difference that I could perceive was that they had lost much of their fat. I tried the system of cramming two or three of them with pieces of dog-fish ; but they rapidly became thin and died. After having been many days without eating, I have seen them refuse their natural food, though placed by their side. They may occasionally be seen and heard as much as forty miles distant from their place of resort. Using their flippers as fins, they are enabled to swim beneath the surface as rapidly as a fish. Not being provided with wings, they cannot obtain a footing on land, unless it be shelving, although they do not scruple to leap from a precipice into the water. In one of my peregrinations I observed a troop of them close to the edge of a precipice, sixty feet in height, and, although obliged to crawl on hands and knees, made sure of a capture : they very leisurely awaited my approach, and when I was within two or three feet of them, tumbled head foremost down the cliff. I have never seen these birds, or, indeed, any of the organized beings which frequent the guano islands, on the mainland. And this is a point to which I wish to direct particular attention. They feed upon a sort of rock-fish,\* which are about the size of sprats ; also upon a species of small herring and small muscles ; a green sea-weed

\* These fish are viviparous, like the dog-fish, and frequent the gullies on the island, which are washed by the rollers. (Blennius, nova species.)

has been likewise found in their stomachs, but this I apprehend has been taken medicinally, for they seem to be of delicate constitution, and not long-lived; their flesh is coarse, red, and vascular; their livers, however, were preferred by the seamen to salt provisions. Their eggs are of the colour of duck's eggs; larger, but not much stronger in flavour. Their flesh, their flippers, and the fat or blubber are analogous to those of seals. The wind-pipe divides immediately below the larynx into two tubes, which continue down the neck, side by side, like a double flageolet; they have, in fact, a double trachea. Their fur or feathers are very fine, and might, I think, be converted to some use as an article of dress. Some of those which escaped at St. Helena, after a long swim, returned, wagging their tails, and looked up at the ship, and then again disappeared. One of them, less fortunate than the rest, made for the shore, and I saw him tied up by the leg, in the custody of a little boy. On my asking him if he had been bitten, he pulled up his sleeve and showed me the impression of the bill upon his arm. As their eggs may be collected in the depth of winter, they probably incubate more than once a year.

A smaller species (*eudyptes minor*) had gray plumage on the breast, without the black and white bands. Many of the larger birds could not be distinguished from the variety known as the *spheniscus magellanicus*.

#### THE SHAG.

The shag (*phalacrocorax capensis*) is a much smaller bird than the penguin, being about the size of a duck. It has a very long neck, and flies with

a rapid motion, at no great distance from the surface of the water, making a noise like a moorhen ; it takes to the water readily if wounded, dives, and swims for a considerable distance underneath ; but in this respect is far inferior to the penguin. It loves to sit upon the pinnacles of rocks, and associates with penguins which are sometimes assembled round the base of the same rock. The plumage is of a dark brown, approaching to black, with occasionally a white spot on the upper part of the tail and back ; the bill is long and slender ; at the base of the inferior mandible there is a patch of orange yellow membrane, which, however, in many birds is entirely wanting. One which flew on board the vessel from exhaustion, when we were at a considerable distance from the island, had iridescent plumage, like some kinds of domestic fowl ; the eyelids were alternately dotted with a beautiful blue (ultra marine) and black, and the iris was of a fine emerald green. I have not seen these fine colours in the dead bird. There was a patch of orange yellow under the chin. The flesh of the shag resembles that of a hare ; when kept two or three days it becomes tender, and makes good soup and sea-pies. It has a shrill cry at night, which may be heard for a long distance.

#### THE SEAL.

The seals which frequent this island are of that description called fur, or ursine seals, (*Arctocephalus ursinus*.) A thick layer of fat under the skin called blubber is the part from which the oil is procured. The skins of the full grown animal are very large and thick, and well adapted for leather. The hair of the large seals is gray, that of the young



being of a dark brown, approaching to black. The hair is much longer than the fur, which is mixed with it as the down among feathers, and becomes visible when the hair is pulled out; it is of a light brown colour, very soft, and much longer in the young than in the old seal. They are furnished with whiskers of the consistence of whalebone, and have as many as twenty teeth in the upper jaw, and sixteen in the lower; the molares are twelve in the upper, and ten in the lower jaw; they are all wedge-shaped, and dove-tail into each other, the maxillary articulation not admitting of anterior or lateral motion; two tusks in the upper jaw, with a pair of canines, and four incisors in each make up the complement. A small cub, which was shot, had the following dimensions: from the muzzle to the end of the tail, 3 ft. 9 in.; in circumference, 2 ft. 2 in.; it was provided with thirty ribs, and the sternal pieces were eight in number, round anteriorly like the spine bones of fish, and flat posteriorly: the pelvic aperture was very narrow and contracted; and the skin, which had been dried and stretched measured 2 ft. 6 in. by 3 ft. 6 in. Very much larger ones were also captured, but I had not an opportunity of seeing them. Their fore-flippers consist of an assemblage of bones, much resembling those of the human foot, firmly bound together with ligaments, and covered with a skin or glove. The hind-flippers bear a still stronger resemblance to a gloved hand and fingers: the former are used as fins in the water, the latter in climbing the rocks. The stomachs of those which were procured were filled with large pieces of fish, which had all the appearance of having been bitten out with the teeth. Several of them having been shot by persons from

the different vessels which were lying here, they became shy, and would seldom come on the island except at night, or when driven on by the violence of the rollers, and then invariably getting access to it at those parts which were lowest: they are not easily killed, and unless shot in the head, escape to the water, dive, and are seen no more. It is useless to shoot them in the water, and the best method of destroying them on shore is with clubs made for the purpose. Their bite is as severe as that of a dog; they bellow like a calf, and when surprised roll over in a curious manner into the water. During calm weather they are fond of basking at the surface in the heat of the sun, and generally congregate in circular groups, and often expose no other part of the body but the anterior flippers above the water; occasionally, however, they would come up singly close to the ship, but would immediately disappear. When sportively inclined they leap out of the water after each other much after the manner of porpoises, for which they might easily be mistaken at a distance. They love to leap in this manner over the tops of rollers and breakers, and seem to have no fear of being dashed against the rocks. They are supplied with a thick membranous bag in the vicinity of the stomach, which upon being opened was found filled with granite pebbles, supposed to have been swallowed to enable them more easily to descend in the waters.

Their bodies are very heavy; and some large ones, which were shot, could scarcely be dragged out of the reach of the rollers by the united efforts of ten or twelve men.

## THE GANNET. (SULA BASSANA?)

When we arrived at the island on the 25th of June (the depth of winter in this part of the world), there were but few gannets to be seen, and this continued to be the case until the latter end of September. About the time of our departure, however, and when the sun was coming south of the equator, matters were entirely changed, and extensive flocks of them began to arrive from the north; but finding the island pre-occupied by our men and apparatus, they did not at first feel disposed to settle there, but would sit in great numbers on the water\* for hours together, till the wind would sometimes fairly drift them close to the ship, when they would fly up in a cloud and seek a resting place at a greater distance. Small parties or single individuals would be constantly passing to and from the main body and the island, and in other directions: there was in this manner a circle of many thousands constantly wheeling round the island, and anxiously looking for a spot where they might alight with safety; their cackling was incessant, and every day they appeared more numerous and anxious to alight, till prompted by the desire of incubation and the abundance of food, their wishes could no longer be resisted, and they began to settle upon the north and south extremities of the island, leaving us still masters of the centre. The shags and penguins which had previously occupied these spots were dispossessed and fairly driven away. They seemed, indeed, determined to carry the island by storm, and a few hours after we had

\* I have seen, as far as I am able to judge, the space of a square mile covered with them.

got every thing off (Oct. 2d), about 40,000 or 50,000 of these fine birds had alighted upon the island to make it their habitation and their home. They feed upon the small herring before mentioned, of which their skin smells strongly; their flesh, however, something like the shag, is not of an unpleasant flavour: they have short legs, and are very awkward on land. One of them permitted itself to be caught, and of this specimen the following is a description: from the extremity of the bill to the extremity of the tail, 3 ft. 2 in. ; breadth from the tip of each wing, 5 ft. 5 in. ; circumference of the body, 1 ft. 6 in. ; bill,  $5\frac{1}{4}$  in. in length, tapering to a point; the palate furnished with horny central and lateral ridges, and intervening depressions which fit into corresponding processes in the lower mandible; the bill is of a light-drab colour, inclining to blue. A black band of skin, having the appearance of braid, and uncovered with feathers, passes from the base of the lower mandible half way down the neck; other bands of the same nature pass from each angle of the mouth a short distance backwards. These three processes of membrane are connected with each other by a continuation of the same band, passing round the eyes, and giving the appearance of a pair of spectacles; the eyelids were of a beautiful smalt blue, and the irides of a silvery white, resembling in colour and markings a Geneva watch-dial; the muscular fibres being distinctly visible; the plumage of the head and neck yellow, inclining to brown; the rest of the body white, except the large feathers of the wings and tail, which were black or dark brown; the skin in front of each toe was marked with a stripe of a lemon-yellow colour; the rest of the skin of the webbed foot was black.

## THE GULL.

A large bird resembling the herring gull (*Larus fuscus?*) frequented the island and the waters around it: as I could not procure a specimen I am obliged to insert the following description taken from seeing them frequently on the wing.

Plumage white, except the upper surface of the wings, which is dark brown; bill yellow, with a hooked process at the extremity of the superior mandible, which fits into a depression in the inferior one: it would greedily devour any offal which was thrown from the ship, such as the entrails of dog-fish. &c. Its method of getting at the contents of a muscle-shell was interesting; after carrying it for a considerable height, by letting it fall upon the rocks the shell would be broken, and the bird obtain access to the inside. This bird is powerful on the wing, frequents the island, rests occasionally upon it, and is not seen at any great distance from land.

## THE CAPE PIGEON.

The bird called by seamen Cape pigeon is known to naturalists as the pentado petrel (*Daption Capensis*); it is powerful on the wing, and will follow the ships for many hundred miles; they are not particular as to food, and may be caught with a hooked pin and line baited with a piece of fat pork; they are unable to fly up from the deck, as their legs and feet are of but little use to them except in the water, and I never saw them on the island. I have not met with them nearer the equator than Hollam's Bird Island (latitude 24 deg. 27 m. S.), and that during the winter; as the sun was advancing they appeared to be leaving for colder weather. On the passage out, indeed, when the weather was warmer,

the first time I saw them was between 33 deg. and 34 deg. S., and not further from land than 2 deg. E. longitude. The following description is taken from one caught in the manner above mentioned. From the tip of the feathers of one wing to the tip of the other, 2. ft 10. in ; from the point of the beak to the end of the tail, 1 ft. 4 in. The bill is black, a protuberance on the upper mandible divided into two openings forms the nostrils ; its extremity is hooked and fits into a depression in the lower one : plumage of the head and neck black, that of the back white spotted with black, the wings and tail are edged with black ; a black bar crosses over the upper surface of the wings about the first joint ; the plumage of the front and other parts of the body is white.

#### THE ALBATROSS.

Although I have not seen them so far north as Hollam's Bird Island, I may as well here observe, that the majestic bird the albatross, and another which accompanied it, called the Cape hen, made their first appearance on the 18th of April in lat. 31 deg. 38 m. S. and long. 20 deg. 39 m. W. Though a few Cape hens were to be seen at Possession Island, yet I apprehend that the greatest number of them, and also the albatross, had gone farther south : the *interesting* account which Morrell gives of the beautiful order and regularity observable in the arrangement of the nests of these and the guano birds, the reader would scarcely suppose to be entirely *fanciful*.\* I have never heard of any

\* "The feathered tribes," he remarks, "are very numerous on the lonely isles in the southern hemisphere, both in the South Seas and South Atlantic Ocean. Of penguins there are four kinds which resort to the Falkland Islands, viz., the king, the macaroni, the jackass, and the rookery

such order and regularity on this coast, and do not believe that it exists: I have not seen any of the albatross, or Cape hens, on shore; being very powerful on the wing they traverse the ocean for immense distances; and I imagine their places of incubation to be in colder climates.

#### WHALES.

While speaking of the natural history of the island I may as well observe that numerous whales of the fin-back species frequented it during part of the time that we were at anchor there; viz. during

penguin; but the most remarkable bird found on these shores is the penguin's intimate associate and most particular friend, the albatross. When a sufficient number of penguins, albatrosses, &c., are assembled on the shore, and a deliberate consultation on the subject has been held, they proceed to the execution of the grand purpose for which they left their favourite element. In the first place they select a level piece of ground, often comprising an extent of four or five acres, as near the water as practicable, always preferring that which is the least encumbered with stones. As soon as they are satisfied on this point, they proceed to lay out their plan, which they commence by tracing a well-defined parallelogram, of sufficient magnitude to accommodate the whole fraternity. One side of this square runs parallel with the water's edge, and is always left open; the other three sides are differently arranged. These industrious feathered labourers next proceed to clear all the ground within the square from obstructions of every kind, picking up the stones in their bills, and carefully depositing them outside of the lines before mentioned, until they sometimes create a little wall on three sides of the rookery; within this range of stones and rubbish they form a pathway, quite smooth, six or eight feet in width. This is for a general promenade by day, and for the sentinels to patrol by night. The whole area is then laid out in little squares of equal sizes, formed by narrow paths, which cross each other at right angles, and which are also made very smooth; at each intersection of these paths an albatross constructs her nest, while in the centre of each little square is a penguin's nest, so that each albatross is surrounded by four penguins. In this regular manner the whole area is occupied by these feathered sojourners of different species, having at convenient distances accommodations for other kinds of oceanic birds, such as the shag, or green cormorant, and another, which seamen call the Nelly."—Morrell's Narrative of a Voyage to the South and West Coast of Africa. (Edition by Lieut. Petric.) 1844. Appendix, pp 126, 127.

the month of July, they visit the bays during the spring, in order to calve, are fond of sporting about the reefs, and are often seen in pairs; they would in this way sometimes swim entirely round the ship, and so near it that they might have been struck with a harpoon from the side. The representation given in prints of the water spout which ascends from them is considerably exaggerated: it is merely a thin shower of water, which is driven up when they come to the surface, by the force of expiration, familiarly termed blowing: the plane of their flukes or tail is horizontal, and the reverse of that of the body; it forms a most powerful organ in assisting them to ascend or descend. On one occasion I saw about a mile distant, a fish called the thrasher: his tail was elevated for a considerable distance out of the water, with which he was belabouring the side of a whale; the noise of the blows, as well as the moaning and blowing of the whale were distinctly heard at that distance. After enduring this flagellation for a short time, the whale and his tormentor both sank together, and I saw them no more.

One species of polypus, called the sea anemone (*actinea*), which is cited by botanists as a connecting link between plants and fish, frequents the gullies on the island. It has much the appearance of a china-aster, the colours being not so vivid; it adheres by atmospheric pressure to the shells, &c. at the bottom of the gullies. If touched they retract the rays and disc of their flower, eject water, and completely change their form.

The shells, like those on other parts of the coast, possess very little interest; they consist of four species of univalves: *Ranella argus*, *purpura trochlea*, *purpura squamosa*, *buccinum papyraceum*: two of muscles; *mytilus unguatus et crenatus*, and limpets.



## CHAPTER IX.

Natural history of guano—Seal, bird, and cake guano—Ammoniacal salts—Bird and human mummies—Tanning qualities of guano—Addled eggs—Guano pools—Excrement—Mistaken opinion respecting the origin of guano—Its true source—Not found on the main land—Important inquiry where more guano is to be found—When will it be again deposited on the exhausted islands—Other birds and animals probably guaniferous—Longevity of guaniferous birds, unknown—Climate of the coast.

### NATURAL HISTORY OF GUANO.

THE guano on the island when we arrived, consisted of about 450 tons; the principal part being in one lump between three and four feet in thickness, chiefly composed of seals; there was besides on the higher rocks a small portion of a lighter consistence, derived from birds; a third portion was closely impacted and caked together, in contact with the surface of the rock, and requiring some force to separate it from the granite, to which it gave the white or brown colour; this had so little the appearance of guano as to be mistaken for rock stone. As these three distinct varieties were found also at the other guano islands, I shall devote a short space to their separate consideration.

## SEAL GUANO.

The first, which I have called seal guano, had the consistence of damp clay or rotten cheese, to which it bore some analogy, also, in smell. It was of a dark brown colour, and mixed with small pebbles of granite, which were dispersed through it, and in some parts contained in bags *partly decomposed*, and exactly the same as those described in the history of seals, and used by them as receptacles for ballast. Crystals of the acid biphosphate of ammonia, containing three proportions of water, and of other salts, were also disseminated through it, and were particularly abundant at its lower part; and at the bottom, in contact with the third variety, or "rock stone," were many of them so large as to weigh upwards of three ounces; indeed, in some parts, the surface of this "rock stone" was covered with a layer or stratum of these salts; a crop of these crystals, some of which were of the form of rhomboidal prisms, might also be collected from *among the folds and crevices of rotten and decaying seal skins*;\* and in their skeletons, viz. *in the cranium*. Several skulls of seals (which I picked up) were completely filled with this substance, and also along the course of the spine. Besides these crystals, the clayey lump contained also many bones, a few of which were the long bones of birds; they were in a more or less decomposed state, some of them resembling bones, whose earthy matter has been dissolved out by an acid, having changed their white colour for a brown, and being soft and

\* I have seen these valuable crystals thrown aside and mistaken for rock salt.

pliable; some of them when broken contained also crystals of ammoniacal salts, *in the medullary tube*. There were no feathers in the lump; but at Possession Island, as I have before remarked, where there was much of this species of guano, it contained a large quantity of partly decomposed fur and hair, interspersed with small crystals in rhombic octohedrons of microscomic salt, a compound of phosphate of ammonia, and soda; these were slightly alkaline in their reaction.

#### BIRD GUANO.

The second variety, or bird guano, is of a lighter colour than the former, not so damp nor so heavy, mixed with feathers, and containing numerous 'mummies,' of birds, if I may be allowed the expression:\* upon attempting to tear them open, I found it a difficult matter, but upon using the knife I discovered in *their skulls*, in *their necks*, *abdominal* and *thoracic cavities*, crystals of ammoniacal salts (chiefly biphosphate); their skins were stripped of feathers, and forcibly impressed upon me the idea of their having undergone some change similar to *tanning*. This was strengthened by the following circumstance; some young seals having been shot by the crews of the vessels which preceded us at the island, were thrown aside, (possibly in conse-

\* I have seen some of these mummies exposed in the shop windows in Liverpool; thousands of them have been thrown aside on the guano islands as useless.

Some human bodies which were buried at Possession Island, and I believe also at Ichaboe, more than forty years since, were found in a similar mummified state, and taken to England as curiosities; one of them I saw in a ship's hold at Possession Island, and it has since arrived in this country.

quence of their being called off to attend to their duties,) and when they returned, finding them as they supposed rotten, no further notice was taken of them, till they were picked up by our men, who regarded them as leather. I have one of these seal-skins in my possession, which has all the appearance of leather, and only betrays its origin by a slight smell of guano, which still remains upon it. Some of the larger ones were taken by one of the vessels as leather for the use of the ship. The bird guano is mixed with bones, which also contain the crystallized biphosphate of ammonia in their *medullary cavities*; and sometimes a few eggs may be found buried in it. A friend being anxious to obtain one of these eggs, to ascertain if what he had heard were true, viz., that if put into a saucepan to boil it would blow the lid off, I accordingly gave him one, but did not hear the result; but upon my inadvertently putting some samples into a basket, in which one of these eggs was lying, and which pressed upon it rather unceremoniously, I was startled by an explosion, nearly equal to that of a pocket pistol, and a most offensive odour at the same time saluted my olfactory nerves: this egg had been addled, and the pressure of confined sulphuretted hydrogen gas caused the explosion.

#### CAKE GUANO.

The third variety, stone or cake guano, is common to the first two. Having left England under the common impression that guano was the DUNG of birds,\* when I first saw this substance, I concluded

\* As I think it is fair to conclude that Peruvian guano is produced

that I had at last discovered the veritable guano, and that I should find in it a large quantity of uric acid; but as, upon analysis, it was composed chiefly of *phosphate* of lime, the idea which I had taken was not admissible.

In appearance, some specimens are of different shades of brown, varying from a black to a drab; the different shades are arranged in thin concentric laminæ, which have an irregular and waved appearance, seemingly first taken from the eminences and depressions of the rocks upon which it has become concreted, massive,\* compact, heavy, and copiously intermingled with minute sparkling crystals of ammoniacal salts.

Other curious specimens which had been impacted upon the surface of overhanging rocks, were of a light drab colour throughout, when forcibly separated, bringing off a thin scale of granite attached to their superior surface, containing also minute sparkling crystals, and laminated; the convex surfaces of the laminæ facing downwards and terminating in numerous protuberances, from which the soluble matter had been dripping, after the manner of stalactites, to which they bear a marked resemblance, both in appearance and mode of formation.

in a similar manner to African; I have quoted the following as an instance of this mistake among high authorities. Dr. Ure, in the 'Supplement to his valuable Dictionary of Arts, Manufactures, and Mines,' p. 119, calls guano an '*excrementitious*' deposit; and further informs us that "huano, (pronounced by the Spaniards guano,) in the language of Peru, signifies dung;" he also quotes in the next page, as confirmatory, a passage from Humboldt, in which the Baron says, "During 300 years the coast birds have deposited guano only a few lines in thickness. This shows how great must have been the number of birds, and how many centuries must have passed over in order to form the present guano beds."

\* They forcibly reminded me of some varieties of urinary calculus.

This deposit was of the lightest colour where most exposed to the action of sea-water.\* At Ichaboe, in addition to it, the surface of the rock was covered in some places with masses of decomposed sea-shells, which however contained some ammonia, and formed part of the last cargoes which had been taken from that island. The shells appear to be of an *existing* species of bivalve. Masses of these decomposed shells were also found on the islands at Angra Pequena.

The deposit above described exists more or less at the bottom of the guano, on all the islands which I have visited; and I have likewise obtained samples of it from those in the neighbourhood of the Cape of Good Hope. Besides the varieties of guano just described, there were numerous pools among the rocks at different parts of the island, filled with a brown fluid, and the surface covered with a pellicle of crystals of sea-salt, which was also copiously deposited in the liquid itself. The brown solution of guano found in similar pools at Possession Island, and called by some persons there *guano oil* (from its density), has already been alluded to.

It is merely a solution of guano in the water of dews, rain, or sea-spray.

There can be no question that the *excrement* of birds enters, *partly*, into the composition of guano, but it forms a very small proportion. I saw, on one occasion, a film of a beautiful pink colour (purpuric acid?) upon the surface of the rock; but it was not in sufficient quantity to be collected, and I have not been able to procure any appreciable quantity of uric acid in the analysis of guano.

\* The lightest coloured cake guano contains the least proportion of animal matter and ammoniacal salts.

Morrell gives some analyses in the appendix to his work, and states, that a million of birds have been calculated to produce *by their droppings*, fifteen tons of guano a day; viz., more than half an ounce for each bird; sixteen penguins which were placed in the long boat for four weeks, should, according to this calculation, have produced a deposit of 14 lbs., whereas, there was no appreciable quantity. It may be added, that much of the dung is not deposited upon the islands at all, but is dropped, while flying, into the water and lost. On the African guano islands the birds are found in numbers amounting to many thousands, but not to millions; were it so, and the calculation correct, each million of birds would load a ship as fast as she could take it off; as during our stay at Hollam's Bird Island we did not boat off, upon the average, more than five tons daily.

These birds do not produce so bulky an excrementitious deposit as the birds of our own islands, and their dung cannot be separated from the other constituents of guano.

Such being the appearances which presented themselves to me on my visit to the guano islands, my preconceived notions became entirely changed, and I no longer regarded this product as *entirely* excrementitious, but as composed of the *carcasses* of numerous birds and seals, which either live and die on the islands, or visit them for the purposes of propagation and food. In the natural history of these animals and birds, therefore, is to be found the true source of this valuable product. It is probable that the first deposition is composed principally of seals and penguins; these animals possessing greater powers of locomotion in the water than

on land, are led to prefer the shelving and lowest parts of granite islands, which they can ascend and descend with the greatest facility; gannets and shags may also be associated with them at the same time, preferring the higher rocks of the same island. After the lapse of many generations of these animals, and when an island has become elevated, from the continual accession of their remains, it is easy to conceive that it will be no longer convenient or accessible for seals, and perhaps for penguins; after which the future accumulations will consist entirely of the remains of winged birds: it is also probable from some causes in their habits, with which I am not acquainted, that birds themselves will forsake the guano islands when the mass has attained any considerable altitude; this, I am informed, is the case on the Peruvian coast, where the guano being in some places as much as 300 feet in thickness, is no longer frequented by birds.\* It is to be hoped that their burial grounds may speedily be cleared, that they may renew their valuable deposits. Should any of the islands be so low that they are frequently washed by the sea, the guano will become removed, or very slowly deposited, and these spots will continue to be the resort of seals and penguins.

I have mentioned a rock in Hottentot Bay, a few yards from the main land, where a small quantity of guano, and a few birds were to be seen; the islands also at Angra Pequena are very near the main land; but I have never seen either guano or the birds producing it on the main land: they seem to prefer islands at some short distance from it, and they are invariably *rocks* without a vestige of soil or vegetation:

\* So great an elevation may possibly disable the young from getting access to and from the water at an early age.



I presume that this choice is dictated by the abundance and resort of their food, and possibly from an instinctive dread of the attacks of wild animals upon their eggs and young, should they venture upon the coast for the important purpose of incubation.

As the guano islands along the coast, if not entirely exhausted of their stores, soon will be so : it becomes an important inquiry, in an agricultural and commercial point of view, to know, first, where more can be found ; and second, when any more will be deposited on the islands now exhausted : and these two inquiries can be answered in some measure by a reference to the natural history of the birds and animals which enter into its composition ; wherever these abound they must die, and after having performed that important purpose of their existence, the propagation of their species, their carcasses will become available for man's use.

“ Another race the following spring supplies ;  
They fall successive, and successive rise :  
So generations in their course decay ;  
So flourish these, when those have passed away.”

By referring to the account given in this work of their natural history, the reader will find all the knowledge at present possessed relating to the locality and distribution of these living beings. But there are other birds and animals which must also meet the general doom, and whose carcasses would be doubtless useful as food for plants :\* these may

\* I had some conversation at St. Helena with an invalided ship, owner ; who informed me that he had sent a vessel to search the islands in the neighbourhood of Patagonia and Cape Horn for guano : and if not found, the vessel was to proceed to Valparaiso. It is now well known that guano is to be obtained on that coast.

possibly be found in all latitudes.\* But then comes into consideration another important question, viz. the amount of rain which falls in the given climate, and the consequent deterioration of the guano. The second question, viz. when will there be a fresh deposit on the islands now exhausted, is very interesting, and depends much upon the longevity of these birds and animals, † upon the weight of their carcasses,

\* The enormous penguins brought home from the Antarctic ocean and now deposited in the British Museum, would produce a very bulky guano if the climate would permit its formation.

† Upon this subject little or nothing is yet known; possibly their mortality will keep pace nearly with their rate of increase.

“On the surface of this island (Possession Island, Sept. 1828) I saw the effects of a pestilence or plague, which had visited the amphibious inhabitants of the ocean with as much malignity as the Asiatic cholera has the bipeds of the land. The whole island was literally covered with the carcasses of fur seal with their skins still on them. They appeared to have been dead about five years, and it was evident that they had all met their fate about the same period. I should judge, from the immense multitude of bones and carcasses, that not less than half a million had perished here at once, and that they had all fallen victims to some mysterious disease or plague.”—Morrell's Narrative of a Voyage to the South and West Coast of Africa. New edition, by Lieut. Petrie, R. N. 1844. p. 56.

“These two islands” (at Angra Pequena,) “have once been the resort of immense numbers of fur-seal, which were doubtless destroyed by the same plague which made such devastation amongst them on Possession Island, as their remains exhibited the same appearance in both cases. Shags and penguins had now taken entire possession of the islands.” Morrell, p. 58.

Supposing these to be the same seals whose bodies formed the cargoes of many guano ships seen by us at these places, the period of 22 years (Morrell's voyage being in 1828) can be assigned for the production of the large quantity of guano thereon.

The eggs of penguins were obtained in great abundance at Mercury Island (in the depth of winter), but there had not been a vessel there for some time to disturb them. At Possession Island a few eggs were procured *every morning*, (Jack likes his egg for breakfast;) at Ichaboe a few eggs could be got, the birds here, having been nearly all driven away by the immense fleet of nearly 300 vessels there at one time, now that they were reduced to ten, were returning. No eggs were procured at Hollam's Bird Island. All that were seen were those of penguins, perhaps a few might be gannets: but I never saw any belonging to the shag.

and upon the loss in that weight produced by the action of the elements: and this loss of weight will be also greatly influenced by the humidity of the climate, which leads me to give some account of the moisture on the coast as observed at Hollam's Bird Island.

During our stay of upwards of three months (in the winter season) scarcely a day elapsed without the occurrence of heavy dews and mists: sometimes in the day-time, but generally at night. It could scarcely be called rain but more nearly resembled what in this country is known by the name of a Scotch mist; the shrouds and rigging at night and morning would pour down with heavy drops, and the deck was generally wet enough to penetrate shoe leather. At Ichaboe, I am informed, enough water could be collected from the top of the house to serve the purposes of washing. My stay at the different places was not long enough to make observations that may be depended upon, but the impression upon my mind is that the mists are more prevalent at a short distance from the coast than in its immediate contiguity: thus they were very abundant at Hollam's Bird Island, Possession Island, and Ichaboe, and much less so at Angra Pequena, Walwjch Bay, and Hottentot Bay.

## CHAPTER X.

Chemical history of guano—Water—Probable time occupied in its decomposition—Proximate and ultimate principles of guano the same as those of animal bodies—Animal matter—Phosphoric acid—Biphosphate of ammonia—Phosphate of lime—Decomposition of bone and shells—Phosphate of soda and ammonia—Phosphate of magnesia and ammonia—Uric, oxalic, and carbonic acids—Ammonia—Potash—Soda—Silica and alumina—Importance of guano to chemical science.

### CHEMICAL HISTORY OF GUANO.

THE following are the ingredients which enter into the formation of this product :

Water.	
Animal matter.	
Phosphoric	} mineral acids.
Sulphuric	
Muriatic	
Uric	} organic acids.
Oxalic	
Carbonic	
Ammonia	} alkalies.
Potash	
Soda	
Lime	} alkaline earths.
Magnesia	
Silica	
Alumina	} earths.

Upon each of which it will be necessary to make a few remarks.

## WATER.

Water, as it relates to guano, may be considered in three ways: first, all animal bodies contain a very large proportion of water. Human bodies yield at least five sixths of their weight. It is probable that the guaniferous animals do not yield less. A great proportion of this water would evaporate in a dry atmosphere, but not the whole. Many of the salts of guano could not exist without it: the salts of ammonia especially. Secondly, water is found in the atmosphere in all parts of the world, and most abundantly in hot climates; but hygrometric water is perhaps not prejudicial to guano, so long as it is not in sufficient quantity to wash away the ingredients which render it valuable, or to carry on its decomposition to such an extent that they become volatile and dissipated in the air. These remarks are more especially applicable to water in its third condition, viz. that of rain. If this be abundant, the valuable products will be entirely washed away; if moderate, the decomposition will go on more or less rapidly, depending upon the quantity which falls, and in some measure upon the age of the guano, or the time it has been deposited and subject to decomposing action.

Morrell states, in his account of Possession Island, that there appeared to have been a plague or murrain among the seals, as the island was covered with their dead carcasses. When we were there, after the lapse of seventeen years since Morrell's voyage, these seals (supposing them to be the same) were not so much decomposed but that their fur was distinguishable, and was shipped in large quantities by many of the vessels. The decomposition continues

to progress in the ship's hold, when the guano is very *damp*; that which we obtained, though giving a slightly acid solution in water, and having very little smell of ammonia when first shipped, upon our arrival at St. Helena gave off so much as to produce tears and a difficulty of breathing upon descending the hatchway. This, however, in a great measure disappeared during the passage; but I still observed that the smell was much stronger on a damp night than on a dry one. Even its solution (containing much animal matter) though acid when first filtered, became slightly alkaline after being kept a few days.

The fur of these seals is said to have become converted into powder before arriving in England.

Sea-water, in addition to these ill effects, contaminates the guano with salt.

#### ANIMAL MATTER.

The animal matter is a most valuable ingredient in guano, and the source from which many of the others are derived. It shows, indeed, that the guano has still to undergo further changes, and that the proximate principles\* of the animal bodies are not

\* By proximate principles are meant gelatine, albumen, fibrin, urea. One of these, urea, is a good example of the transition of animal into chemical substances, having precisely the same composition as cyanate of ammonia, a chemical salt, from which urea differs only in being "*animalized*." By chemical principles are meant the chemical ingredients of guano already enumerated, excluding animal matter and water. When decomposition is carried so far that much of the guano is dissipated in the atmosphere, it is probably resolved into its ultimate principles, and can then be no farther decomposed. These are nitrogen, carbon, oxygen, hydrogen, and a few others of little importance. Plants are supposed to convert the chemical into the ultimate principles when they appropriate them as food.

yet entirely converted into the chemical principles ; but these changes will probably take place in the soil through the agency of plants : all the ammonia and the organic acids are derivable from it, and the proportion of *latent* ammonia will entirely depend upon it. I have found as much as 12 per cent. of animal matter, precipitable by acids (albumen ?), in the soluble portion of the guano of this island, besides some which was not so precipitable, and was probably gelatine.

PHOSPHORIC ACID.  
BIPHOSPHATE OF AMMONIA.

Of the mineral acids, the phosphoric is the most abundant and most important in animal bodies, entering largely into the formation of the bones. The nervous matter of animals has been long known to contain phosphorus ; it is important as forming in itself the food of plants, and as producing, with ammonia, a salt least liable to become decomposed and removed in a moist climate. I have generally found it in the state of *acid* biphosphate of ammonia, and composed as follows :

	Per cent.
1 equivalent of phosphoric acid . . . . .	71.4 = 61.79
1    "    ammonia . . . . .	17.15 = 14.84
3    "    water . . . . .	27 = 23.37
	115.55    100

At Hollam's Bird Island, this salt having been dissolved by the dews and mists, had filtered, as it were, through the guano, and had become crystallized through its substance, but most abundantly at the bottom. It is very soluble in water, but if not washed away is a most permanent salt, and not likely to be dissipated by the air. I have found it

to be also the most abundant compound of ammonia in African guano. Its presence in skulls and bones is exceedingly curious and instructive, especially in the cavities of long bones; for since marrow does not contain nitrogen, the ammonia of the salt cannot be derived from that source. Possibly the animal matter of the bone has undergone some change by which the ammonia has been formed, and the phosphoric acid has then been taken away from the bone itself: the bones containing it are generally in a decomposing state.

#### PHOSPHATE OF LIME.

Phosphoric acid is also in union with lime. This salt forms the principal part of the bones of animals, and, according to the analysis of *all* chemists, of every description of guano also. It enters largely into the composition of the stone or cake guano before described, which having lost its soluble matter by the continual washing of the sea over the island, had become impacted and caked upon the rocks. The trickling of rain through a body of guano, by carrying away the soluble portion, would have the same effect. Independently of its presence on the surface of the rocks, it likewise constitutes the chief part of the insoluble residuum in all guano. It does not form so valuable a manure as biphosphate of ammonia, but more so than ground bones, which are much employed in many soils. It is composed of

8 equivalents of lime . . . . .	228
3       ,,       phosphoric acid . . . . .	214.2
	<hr/>
	442.2
	<hr/>



It would be curious, as a matter of chemical inquiry, to ascertain how the bones have thus lost their form, and become converted into a pasty mass. Can the conversion of its animal matter into ammonia and other products, by breaking up its structure, have destroyed its principle of cohesion? There are many bones, and some whole skeletons, lying in dry situations, and out of the reach of the guano, which, like the mummies\* of birds, still preserve their form, and the cake guano, where frequently washed by the sea, has somewhat the appearance and texture of shell; while that which lies in hollows, and over which a solution of the guano occasionally trickles, is of a darker shade and of a less solid consistence.

The shells at Ichaboe and Angra Pequena, which were lying at the bottom of the guano, were converted into a homogeneous mass, of the consistency of whiting, and contained ammonia; so that their phosphate of lime had been disintegrated in like manner.

The large amount of phosphorus necessary for the formation of these salts is derived by the seals and birds from the fish upon which they feed. The waters of the ocean on this coast are very phosphorescent, and the sea would frequently break over the island during a dark night like a sheet of fire.

\* I have one of these mummies in my possession, which *was buried in the guano*, and from which the bones are removed, leaving nothing but the skin, the bill, and the flippers. Numerous crystals were found upon the internal surface, and seem to have preserved and tanned it.

## PHOSPHATE OF SODA AND AMMONIA.

This salt is found abundantly at Possession Island, in rhombic octohedral crystals, mixed up with the hair of the seals; and also at the bottom of the guano at Hollam's Bird Island, in association with crystals of biphosphate of ammonia; it is alkaline to test-paper, does not effervesce with acids, is called microcosmic salt, is used in chemical inquiries as a flux, and consists of

	Per cent.
1 Phosphoric acid . . . . .	71·4 = 35·75
1 Ammonia . . . . .	17·15 = 8·17
1 Soda . . . . .	31·3 = 10·63
10 Water . . . . .	90·0 = 45·45
	<hr style="width: 10%; margin-left: auto; margin-right: 0;"/>
	100

It is a very valuable constituent of guano.

## PHOSPHATE OF AMMONIA AND MAGNESIA.

Phosphate of ammonia is also in union with magnesia, forming another double salt, which being almost insoluble is united with the phosphate of lime and animal matter, to constitute the insoluble part of the guano, and it forms also glittering crystals in the stone or cake guano; some of this latter, however, when much exposed to sea-water, appears to be entirely devoid of it, and to consist wholly of phosphate of lime and animal matter; its composition is as under

	Per cent.
1 Phosphoric acid . . . . .	71·4 = 30·11
2 Ammonia . . . . .	34·3 = 10·23
1 Magnesia . . . . .	41·4 = 17·46
10 Water . . . . .	90·0 = 42·20
	<hr style="width: 10%; margin-left: auto; margin-right: 0;"/>
	100

## SULPHURIC AND MURIATIC ACIDS.

The two other mineral acids, sulphuric and muriatic, are present in small quantities in animal structures, and likewise in sea-water. They are generally combined with the fixed alkalies, potash, and soda, and occasionally with ammonia. Common salt (chloride of sodium) is frequently deposited in much abundance by the evaporation of sea-water, with which the guano has been intermingled; but this can only be the case at those islands which are washed by rollers, or whose small elevation and mechanical arrangement induce the formation of spray.

## ORGANIC ACIDS.

*Uric, oxalic, and carbonic acids.*—These three organic acids are formed from the animal matter, being composed of the same ultimate constituents in variable proportions. They have the faculty of passing from one to the other as the decomposition advances. Thus uric acid, a fixed and insoluble product, so long as it remains such, under favorable circumstances undergoes various changes, and gives rise to *volatile* and *soluble* products, one of which is carbonate of ammonia. Oxalic acid is also prone to be resolved into carbonic acid.

The principal and most important agent in the production of these changes appears to be water, for which reason guano deposited in a dry climate is so much to be preferred.

I have made several attempts to discover uric acid in the guano of this island, but without success.

## AMMONIA.

Ammonia is considered as the most valuable ingredient in guano; the salt which is most permanent in a moist climate is the biphosphate; but the urate of ammonia is by far superior, on account of its comparative insolubility, and also because the uric acid yields a large quantity of ammonia by its decomposition in the soil, in addition to that with which it is chemically combined.

Carbonate of ammonia is found chiefly in *damp* guano; it is perhaps the least valuable of the salts of ammonia, on account of its volatility. The smell which guano naturally possesses arises from the escape of this salt; but though guano with a strong smell is usually preferred, it is not at all a good criterion; as that which has no smell will often contain a much larger quantity, combined with such acids, as prevent its volatilization.

A much better test of the quantity of ammonia present is to mix some of the guano with caustic, potash, or lime, which, uniting with the acids, set the ammonia free.

Among the crystals found at the bottom of the guano at Hollam's Bird Island, were some which were entirely dissipated by heat, and were found to be a carbonate, or rather a sesqui-carbonate, and composed as follows:

	Per cent.
3 Carbonic acid . . . . .	66.36 = 55.78
2 Ammonia . . . . .	34.3 = 28.82
2 Water . . . . .	18.0 = 15.4
	100

These crystals, though clear and solid when first obtained, became opaque and pulverulent; a change

which depends upon the loss of water and ammonia. Some of the crystals appeared to be chiefly composed of this salt; in others, whose bulk was formed of phosphate of ammonia (though not distinguishable when first obtained), carbonate of ammonia became visible after a time by its efflorescence; thus one part of a crystal would effervesce, when touched with an acid, while another part would not. The carbonate of ammonia in these crystals, however, is not intimately mixed or disseminated with the phosphate of ammonia, but seems to have a place reserved for itself, so to speak, and exists sometimes as a stratified *vein* through the crystal, sometimes filling a *perforation* in it (as if a hole had been bored through the phosphate of ammonia and filled up with carbonate), sometimes filling the hollows, or as an efflorescence on its surface: great numbers of the crystals of phosphate of ammonia were found to contain, therefore, more or less carbonate.

I have good reason to believe that ammonia is also combined with carbonic acid in such proportions as to constitute the bicarbonate.

Potash and soda are occasionally united with the mineral acids, but in small quantity; their salts, however, do not enter extensively into the composition of guano.

Lime is sometimes combined with oxalic acid in the insoluble portion, and mixed with phosphate of lime, but I believe it is much more frequently present as a carbonate.

Magnesia may be found in combination with phosphoric acid and ammonia. Silica and alumina are present in the remains of animals only in minute quantities, and in this point of view are of no im-

portance in the composition of guano. But guano islands, which are in close proximity with a sandy coast, are likely to become impregnated with particles of sand, which being wafted by the wind, contaminate the guano, sometimes to a considerable extent.

Sand does not appear to be used by the guaniferous birds for the purpose of triturating their food; they seem to be provided with a thick membranous stomach, far less muscular than the gizzard of land birds. The granite pebbles swallowed by seals for the purpose of ballasting them, have already been mentioned, and are found dispersed through masses of seal guano. As it has not been the design of this work to enter largely into the chemical history of guano, I have merely directed attention to it so far as to elucidate the phenomena which presented themselves to me. And I hope sufficient has been said to remove every moral doubt, "*that it is not formed exclusively by the dung, but chiefly by the carcasses of birds and seals.*"

The chemistry of guano presents a most extensive field of inquiry, and is likely to lead to important discoveries in that hitherto intricate and neglected department of the science—animal chemistry.

It is probable that the *combination* of the different substances entering into its composition will be found more favorable to vegetation than any of them individually. Animals do not thrive so well upon one description of food as upon a variety. In the wise order and regularity in which everything has been disposed by a bountiful Providence, animals are as necessary for the food of plants as plants are for the food of animals.

## CHAPTER XI.

Difficulties in procuring our cargo—Cable parted and driven to sea—Cast anchor again—Dragging and slipping of second anchor—Loss of long-boat—Staysail rent—Loss of the pinnace—Chronometer at fault—Jibsail rent—Cast anchor again, and again dragging—Loss of two more anchors—Again at anchor—New cargo-boat built—Loading—Preparations for departure—Under weigh—Slipped anchor re-discovered, and its remains got up.

WE were not destined to obtain our cargo without much difficulty and trouble. After having loaded and dispatched the vessel lying at the island, we commenced on our own account. Much time was occupied in arranging the anchor of the jackstay in such a manner as to support the necessary strain; this had not been long completed when the sheers gave way in the night, and were obliged to be supported with four additional and much larger spars. But these, with the loss of buoys, &c., were considered as trifles, especially as many ships kept coming down the coast, looking for cargoes, both from the north and south. When we had shipped about 200 tons of the guano, on the 20th of August, just six months after leaving England, our first serious misfortune occurred. Word was brought in the afternoon that the cable had parted, and we were drifting away from the island. The loss of an anchor and forty-five fathoms of chain, at such a place as Hollam's Bird Island, was of some import-

ance, especially as many of the men being upon the island, scarcely enough were left on board to work the ship properly.

After an absence of three days we again arrived, but all attempts to recover the missing anchor were ineffectual. The following morning, as the breeze freshened, the ship was discovered to be dragging her anchor, and this increased to such an extent that in less than two hours we had drifted five miles nearer the shore. Directions were given to loose the fore-topsail, when one of the men engaged in so doing observed the cable suddenly leap out of the water to the height of thirty feet, and it was therefore concluded that something had given way. Great exertions were made to get in the cable, but the physical force on board was not sufficient; the most that could be accomplished during a strong breeze and heavy sea was to get in so much of the chain as to reach to the next shackle (fifteen fathoms). It was then unfastened, buoyed, and committed to the deep, the precaution being taken of noting, first, the bearings of the spot. As we were not prepared for the occurrence of this accident, the long boat and pinnace were still in the water. The former, a fine cargo-boat, carrying eight tons, we could do nothing with, as we had not sufficient power to get her on deck; the latter, which was being towed by the side of the ship, was got up a short distance from the water, but still left outside the bulwarks, and made fast to the main rigging. Ninety-three fathoms of cable were attached to the anchor when we slipped, and the strain was sufficiently great as deeply to indent the lining of the windlass and start the hawser pipe. The wind had by this time increased to a gale from S.W., and was accompanied by a heavy



sea. All the sails we dared to set were the two top-sails, double reefed; but the ship rolled so much that the mainsail (reefed) was subsequently added. About ten o'clock p.m. the long-boat before mentioned, which was towing astern, filled, turned bottom upwards, snapped the strong hawser by which she was attached, and disappeared. The next thing that gave way was the fore-topmast staysail, which was rent. During the night the pinnacle, which had seen so many vicissitudes, and was suspended to the main rigging on the starboard side, shipped a sea, which carried away every part of her except the stem and stern. We were now deprived of every boat that we had originally brought with us except one, a long-boat, in a leaky condition. As we had been removing or discharging ballast before we were driven from the island, the ship was not in proper trim, and some empty water-casks were therefore filled with salt water in order to effect this desirable object; and as the chronometer was very much at fault, we could form no idea of our longitude from the indications given by it.

The next day the jib was carried away. We had forty-five fathoms of cable still left in the ship, but no anchor sufficient to hold us at Hollam's Bird Island. Two small ones were therefore lashed together, one having been brought up at Ichaboe, and the other being a kedge-anchor. After an absence of four days we again cast anchor on the lee side of the island; but our troubles were not yet at an end. As it was very desirable to do so, we determined, if the weather would permit, to wait till next morning, and then use every exertion to recover the lost anchors; but towards evening the ship began to drag again. An attempt to weigh the anchors

proved unsuccessful; another plan was therefore adopted, and sail made upon the ship while still dragging her anchors with the intention of weighing them, when the dragging ceased. We arrived in deep water about eleven p.m.; the ship was laid to, and the cable weighed, but upon getting to the end of it, both the anchors had disappeared. We had left the men on the island with only a scanty supply of water and provisions, and therefore it was desirable to return as quickly as possible. They were relieved, however, by the kindness of the captain of a brig who cast anchor at the island during our absence. After being away eleven days, the weather being very calm, we again came to anchor by our remaining kedge, which fortunately held us during the night. In the morning a bower-anchor, which had been used at the jackstay, was weighed for the use of the ship, and replaced by the ship's kedge and a smaller anchor. By this means our cable was increased to the length of seventy-five fathoms, and we had an anchor, which, by good fortune, held us during the remainder of our stay at the island. We were now once more in a fair way to recommence loading; but having lost our best boat, this proceeding was carried on very slowly; a new boat was therefore designed, built, and launched: it is true that she was not of the most elegant construction, being somewhat of the shape of a barge, and endowed with the faculty of locomotion in any direction, like a crab; but she answered the purpose remarkably well, and with the assistance of a line connected with the ship and jackstay, by which she was hauled to and fro, was of very material assistance in loading. This, with the loss of another buoy or two, and the chafing through of the jack-

stay, constituted the principal items in our catalogue of troubles. By means of this boat we procured in one day as much as thirty-eight tons and a half of guano. This was the only occasion, however, on which we obtained so much.

On the 2d of October, everything being got off the island, the boat went ashore for the last time. A bottle, corked, sealed, and inclosing a manuscript for the information of future voyagers, purporting that the barque Jessie, of Liverpool, after having been driven three times from her anchors, had succeeded in getting off the last of the guano, was sent by it and deposited upon the island. The boat being backed astern to within three or four feet of the rocks, the last four persons on the island having made fast a line round their bodies, the other end of which was held by those in the boat, jumped into the water, caught hold of the boat's stern, and were lifted into it.

After making some further attempts to recover by dragging and grappling the anchor first lost, which were unsuccessful, we got under weigh on the 4th of October, leaving the gannets in fair possession of Hollam's Bird Island, to deposit perhaps *in a few years*, a sufficient number of their *carcasses* to form the cargo of another ship. We sailed gently along the coast with the hope of discovering the buoy of the anchor which had been slipped on the second occasion of our being driven away; in this we were fortunate, the buoy was discovered by mere chance a few cables' length on our larboard beam when first seen, and in three minutes more would probably have been passed unnoticed, as it was deep in the water; a kedge anchor with a larger buoy was let go to mark the spot, which, after some difficulty on

account of a fog springing up, was again discovered, and we cast anchor once more on the coast of Africa, about the same spot where we had first seen the buoy, in thirteen fathoms water. The next morning the anchor was got up, but was found broken across the shaft, which was supposed to have occurred when we were driving and the cable leaped suddenly out of the water. Before the close of the day we again got under weigh; and the following evening (Oct. 7th) were out of sight of land; and had dry decks to walk upon for almost the first time since we had been located upon this misty coast.

## CHAPTER XII.

Passage home—Guano in the water—St. Helena—Geology—Diana Peak—High Knoll—Town—Water and waterfall—Ladder Hill—Plants—Cactus—Cochineal—Birds—Expense of provisions—New mode of slave dealing—Departure—Latitude and declination the same—Ascension—Equator—Baffling winds—Squalls—North-east trade—Meteorological phenomena—Gulf weed—Western islands—Arrival in channel and at Liverpool.

WITH a fair wind and light hearts we bade adieu to the shores of Africa. On the 10th of October, in latitude about 20 deg. S. and a little east of the meridian, we passed a streak of guano in the water; it extended for thirty miles, and had the appearance of having been pumped and thrown out from some leaky vessel; and on the 15th we cast anchor opposite the church at St. Helena. This being the first port which we had seen of any description for many months, I shall perhaps be excused for inserting in this work some of my observations upon it during our stay of three days. St. Helena is about the size of the Isle of Wight. As viewed from the sea it appears to be of a quadrilateral form. The south-western angle is formed by conical rocks, upon which the farmers collect the eggs and guano of sea birds; but not of the penguin, which prefers colder climates. It consists of a vast mass of volcanic tufa of a brown colour, arranged in mountains of nearly the same height, separated from each other by deep ravines. The centre of it is the most fertile; the tops of the mountains being divided into farms, and

covered with verdure. The south-eastern angle has the appearance of the section of a crater which has been filled up by the same substance, and the sides of it are stratiform, as indeed is the case along the precipitous sides of the island: thin veins of red sand-stone and of steatite are visible in some situations, and the latter is found on the tops of some of the mountains, where I was informed that fossil shells were to be found, but I did not see any: the mass of tufa is breaking up into cubical fragments, with which the walls forming the side of the mountain roads are formed, they resemble the slags of an iron furnace, many of them being cavernous, and others mixed with crystals of quartz (zeolitic). It appears to have been the result of submarine volcanic action, and is entirely different, in this respect, to any part which I have seen on the African coast.

The highest point towards the south-west, called Diana Peak, is 2,700 feet above the level of the sea. High Knoll, to the right of the town, is 1,903 feet in height; and another hill, on which the judge's residence is situated, is 1,180 feet high. The island is fortified in every accessible place with batteries and other military contrivances. The climate is very fine and salubrious, and I imagine from the healthy appearance of its inhabitants, affords but little employment to the medical profession.

St. James's town is situated on the north-western side of the island, in a deep ravine between two lofty mountains, one of which (High Knoll) has just been referred to. It consists of one principal street of about a mile in length; in the upper part of which are situated the barracks, occupied by 500 or 600 soldiers, called the St. Helena regiment. A mountain stream of beautiful water runs through the

gardens at the back of the houses, and supplies the inhabitants and the shipping with this necessary of life in a state of purity and abundance.\* Ascending the course of the stream, it divides with the ravine into two; that on the right hand tumbles over a perpendicular eminence 260 feet in height, like a thread of silver, and falls into a reservoir below, from which, by means of pipes, water is conveyed to the houses in the town, and even as far as Long Wood, the former residence of Napoleon, which is six or seven miles distant. The sun-light, flashing upon the water-fall, the stillness of the air, disturbed only by the brook purling and bubbling down petty elevations under a heap of flowering plants, or by the sound of a gong at dinner-time; the palms growing in the gardens as seen from the zigzag roads cut up the face of the mountains, gave an eastern character to the scene, which was increased by the appearance of the native peasantry, returning from the market place with their asses and panniers, and displaying by their features their Hindoo and African origin.

The ascent up one of these zigzag roads to Ladder Hill and High Knoll would not suit an asthmatic. Ladder Hill is 628 ft. high, and crowned by a fort, which stands upon the edge of the cliff. A shorter cut for the use of soldiers, and those who have the privilege of the *entrée*, leads between the fort and town by means of a ladder of 675 steps up the face of the hill, composed of wood shod with iron, and supported by wainscot rails. The prospect of the descent, which I suppose forms about an angle of 45 deg. is not very agreeable to a novice, and upon

\* Upon our arrival at St. Helena we had less than a puncheon of water left in the ship.

reaching the top or bottom the lower extremities do not forget this extra call upon their muscular energies. High Knoll consists of a round mountain on the top of Ladder Hill, so steep as almost to require hands and knees as well as feet to ascend it. It is also surmounted by a small fort, from the top of which an extensive prospect of the ocean, and different parts of the island presents itself. Among other objects pointed out to the visitor is the residence of Napoleon, so often described as not to require repetition here.

I gathered, during my walks, the following plants : Argemone Mexicana; Datura Stramonium; Fumaria Capreolata; Anagallis arvensis, (cerulea); Euphorbia peplus; the Nasturtium minus of our gardens; Solanum Hermanni, called by the natives Brenjoal, the fruit of which is used for cleaning brasswork, and is highly poisonous;\* the plant has no tubers to its root; Arum Colocasia; Mesembryanthemum magnipunctum; Mesembryanthemum sessileflorum; Hebenstreitia integrifolia, aurea; three species of Eleusine; Cynodon dactylon; several grasses; Physalis Alkekengi; and Cactus opuntia cocchinellicifera, a large plant with flat fleshy leaves, covered with prickles, bearing a red flower and globular fruit on their edges, called the prickly pear; it is not possible to gather the fruit without getting the hand covered with minute hair-like prickles. They are about the size and shape of medlars. The cochineal insect is said to feed upon the *leaves*, and I was informed that a species of cochineal was indigenous to the island, but did not see any. The juice of the fruit is crimson, and stains paper of that colour; the paper stain is fugitive, but

\* Milk is said to have saved the lives of persons who have eaten the apples in mistake.



I think the dye might be extracted from the fruit, either by evaporating the aqueous, alcoholic, or ammoniacal solution, or might be combined with tin oxyde; it deserves more examination than I was able to give it, and is worthy the attention of merchants.

I saw in a garden belonging to the regiment on the left side of the town, close to the water's edge, many doves with slate coloured wings and blue throats; these with averdavats, Java sparrows, and the island canary, which does not appear to be endowed with song, form some of the birds of the island.

The following are some of the prices of provisions at St. Helena. Beef (inferior) and mutton from 10*d.* to 1*s.* per lb.; bread 8*d.* the 4lb. loaf; watercress 3*s.* per bag; small mackerel, about the size of herrings which are caught here in abundance, from 5*d.* to 1*s.* per dozen; brown sugar, very inferior, 5*d.* per lb.; potatoes 16*s.* a bag (about 112lbs.) fine pumpkins, some of them weighing 21lbs. 2*s.* each; coals £5 per ton, and fire-wood £2 per ton: inferior cigars 10*s.* per lb. The island, not being fertile in its whole extent, is not sufficiently productive to afford pasturage for cattle; the mutton is of good quality, but small, and resembling the mountain mutton of Scotland and Wales. The population of St. Helena is about 5000.

Among numerous vessels lying here was her Majesty's steam frigate Penelope, with a novelty in the art of slave-dealing; viz. a slave steamer, which she had taken as a prize, also a schooner which had been engaged in the same nefarious traffic; a barque containing about 450 slaves and belonging to the same parties, if I am rightly informed, succeeded in making her escape.

This green spot in the midst of the sea is a great acquisition to shipping and a residence of three days here, combined with the good things to be found at the ship agents' tables, refits one for a passage over the torrid zone. The officers and gentlemen of the island are affable and courteous to strangers.

Having entered a protest of the damage done to the ship at Hollam's Bird Island, and purchased a new anchor at 35s. per cwt. and having the honour to carry her Majesty's mail, on the afternoon of the 18th of October we got under weigh, and bade farewell to St. Helena. On the 21st our latitude was 10deg. 45m.S. and at noon the sun's declination was the same; I was surprised to find the thermometer in the cabin no higher than 78 deg., the barometer stood at  $30\frac{1}{10}$ . The island of Ascension came into view on the morning of the 23d. It has the appearance, from the sea, of a conical rock, the highest part being near the centre, and perhaps 3000 ft. above the level of the water; there are only about fifty inhabitants resident there, but the island, though apparently larger than St. Helena, is not sufficiently productive to afford them proper nourishment, as they are, I am informed, often without fresh provisions for seven or eight days together, and sea scurvy is consequently prevalent amongst them. Gannets were seen in its neighbourhood, and other birds, said to be peculiar to the island. The last of our penguins made their escape here, but I fear that the climate is not favorable for them.

On the 26th we crossed the equator between 22 and 23 deg. W. longitude; the thermometer at noon stood at 84 deg. and at 10 p.m. at 78 deg.; the barometer did not vary more than  $\frac{1}{10}$  above or below 30 deg. during the day.

We lost the south-east trade wind on the 29th in latitude about 3 deg. N. and longitude 22 deg. 56 m. W. This was succeeded by baffling winds and squalls, accompanied with heavy rain, which continued till November 2d, when in latitude 10 deg. 30 m. N. we had fairly got within the influence of the north-east trade wind. On the 9th we left the tropics; I witnessed in this situation a curious phenomenon. The commencement of the arch of a rainbow in contact with the ocean was visible: it was followed by a few drops of rain and by a gust of wind: and is called by seamen a sun-dog. On the 10th we had got beyond the limit of the north-east trade wind, and were between 34 deg. and 35 deg. of north latitude, and in about 34 deg. W. longitude. The gulf weed here made its appearance: it is a plant of a light yellow colour, bearing round pods; it floats upon the surface of the ocean for many hundreds of miles, and is said to be wafted along by a current called the gulf stream; it has the appearance of branches broken off from a larger plant, and forms a refuge for numerous minute crabs and fish, which in this manner are carried over the wide ocean. On the 17th many vessels were in sight, which like ourselves were waiting for the breeze: eleven sail being visible at one time during the day, which is an unusual number at this part of the ocean. We were in 34 deg. of north latitude and 28 deg. 26 m. W. longitude, very light airs during the day, nearly amounting, to a calm. I witnessed about sunset another curious meteorological phenomenon in the direction of the east. A mist rising from the sea (which I can compare to nothing better than the steam of an immense body of water thrown over the ruins of an extensive fire) rolled in heavy clouds one

over the other, and I expected that the ship would be presently enveloped in a dense fog or heavy rain : when to my surprise the volumes of vapour dispersed and covered a vast extent of the horizon with clouds which presented no extraordinary appearance : it was followed by a slight increase of wind from the same quarter ; several clouds in the south-west were sucking up water from the ocean at the same time : during the night a heavy dew fell, and was succeeded, about two hours after, by rain : these phenomena attended the rise of a fine south-west breeze before which we were wafted, and on the morning of the 18th, only one sail was to be seen of the numerous large vessels which had been our companions the day before. We were in latitude 34 deg. 39 m. N. and longitude 28 deg. 26 m. W. and therefore very close to Fayal, one of the western islands : these came into view on the 20th, when we saw the summit of Pico.

In the neighbourhood of these islands we met with two or three days' calm ; this was succeeded by heavy gales, during which we passed a barque with loss of maintop-gallant-mast. On the 5th of December we came into green water : on the 6th entered channel, and the following morning, Sunday, Dec. 7th, after an absence of 50 days from St. Helena, 64 days from Hollam's Bird Island, and 9 months and 17 days from Liverpool, set foot once more upon the shores of our native land.

## APPENDIX.

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I have much pleasure in adding, for the information of my botanical readers, the following communication respecting the plants brought to this country from the south-west coast of Africa, and for which I am indebted to the kindness of Sir W. J. Hooker, of the Royal Botanical Gardens at Kew.

### *Plants of the coast of Africa, adjacent to the Island of Ichaboe.*

The little island of Ichaboe, treated of in the present publication, claims a more than ordinary degree of attention, from the agricultural treasure it has yielded, in the form of *guano*. Some interest is naturally awakened to know whether so singular a spot affords any, and what vegetation. Plants have been described or noticed as growing there, but on further investigation it is clearly ascertained that, save a few marine cryptogamiæ, which have not been collected, not a trace of vegetable product exists on the island. The so-called Ichaboe plants are obtained from the main land, immediately opposite to Ichaboe, and only distant about three miles.

The fullest collection of them in a living state that has come under our knowledge, was presented to the Royal Gardens of Kew, by Henry Davidson, Esq., of Rosslin House, Hampstead, and consists of the following :

1. *Cerardia furcata*—a new genus of the natural order *Compositæ*, fully described by Dr. Lindley in the ‘Gardeners’ Chronicle.’ It is well known to produce a gum resin on the woody branches.

2. *Pelargonium crassicaule*—L’Hérit. Geran. n. 77, t. 26, and Curtis’s ‘Botanical Magazine,’ t. 477. The only difference between this plant and the specimen figured by Curtis is, that the flower is smaller, and wants the five large purple spots on the corolla; but it must be remembered that the author in question remarks, “the blossoms are white, with a few minute purple dots at the base of the petals, and in the original species not very beautiful, though strikingly so in the variety here represented.” Our plant may be considered the original and native state of the species.

3. *Mesembryanthemum hirtellum*—‘Haw. Obs.’ 284. Decand. Prodr. 3, p. 442. As far as the description enables us to judge, the present plant quite accords with *M. hirtellum* of Haworth, but it has not flowered with us yet.

4. *Mesembryanthemum vaginatum*, n. sp.—Stems short, branching from near the base, thick, obscurely four-sided, leaves opposite, imbricated, ovate, obtuse, the broad base as it were articulated on the large fleshy sheath, and ciliated at the articulation, leaves and sheaths both minutely papillose and crystalline, the former withering.

A species very unlike any we have yet seen, and remarkable for the crowded imbricated leaves,

which eventually wither away, articulated, as it were, on the permanent sheathing fleshy base, beautifully ciliated with white hairs at the articulations. The habit is much that of a *crassula*, but the texture of the foliage is extremely different.

5. *Euphorbia commelini*, Decand. or a species nearly allied to it. Of the same group as *Euphorbia caput medusæ*. The plant is the size of a moderately large turnip, somewhat turbinate in shape, clothed at the top and for half way down, with numerous thickish fleshy branches one or two inches long, these again often proliferous and beset with imbricated tubercles or mammillæ, which are decurrent at the base upon the branches.

6. The plant, indicated under this number, is one of the most remarkable in the collection, and the least known, as regards its genus, or even natural family. It is to be regretted that, though imported living, it has not shown signs of vegetation during the many months it has been in our possession; yet its form and even colour are perfectly retained. It is a straggling, green, somewhat succulent (or rather coriaceous) plant, with terete incrassated stems or branches, subdichotomous, swollen here and there, so as to appear nearly moniliform, with four rows of strong, woody, subulate, solitary spines, an inch or more in length, the broad bases of the spines jointed upon the bark, and in age separating from it, so that the older and lower portions of the stem and branches have only the scars whence they are fallen. But the extraordinary circumstance of this plant consists in the transformation it undergoes, as is seen in our own specimen, and will be more fully related by Mr. Eden. When the plant gradually dies away, the outer rind or bark (for the interior

woody tissue-decays,) becomes hard and assumes a waxy consistency, and finally is quite hard and resinous, burning in a candle, like flame. What is yet more singular, on digging into the sand or soil where it naturally grows, at the base of the plant, the portion that would seem to have been a woody root, is converted into a mass of gum resin, almost the colour (en masse) of a lump of gamboge, brittle, semitransparent, and with a very glassy fracture. Upon showing this substance to Sir Henry Delabèche, at the Economic Museum, he stated, "that a great quantity of the same was lately imported in an Ichaboe ship, but that the merchants, doubtful if it could be turned to any account, declined purchasing it." Mr. Eden has brought specimens of this plant, which exhibit the various gradations from the apparently herbaceous state of the living individual, to that of perfect gum resin. The plant has been supposed by some to be an *Euphorbia*; by others an *Echites*, or allied genus; while Mr. Zeyher, with considerable probability, refers it to *Pelargonium*, or perhaps *Monsonia*.\*

In addition to the above, Mr. Eden has picked up specimens of the following: but for want of the opportunity of drying them by pressure, they are now in a very withered and mutilated condition; affording, in only one or two instances, any clue to their satisfactory determination.

7. A *Statice*, of the *Limonium* group, with articulated branches.

\* Since the above was written, I find by specimens kindly sent to me by Mr. Zeyher, gathered by him in Bushman's country, lat. 29 deg. S. Africa, that the *Monsonia Burmanni*, Decand, (*Geranium spinosum* of Burmann) is a plant closely allied to, if not identical with this.—W. J. H.



8. A *Composite plant*, having a fusiform root and patent stellated branches, hoary, spathulate, succulent foliage, and solitary heads of flowers, with yellow rays.

9. *Mesembryanthemum?* with articulated angular stems and withered leaves; too imperfect to indicate their form.

10. *Mesembryanthemum*, having an affinity to *M. inclaudens*, the leaves are however, shorter, and more obtuse at the angles.

11. *Mesembryanthemum*; of the same group as *M. minutum*, Haworth, in Curtis's 'Botanical Magazine,' t. 1376; but here we observe numerous turbinate branches (if they may be so called) arising from one root.

12. *Mesembryanthemum testiculare*, Haworth, in Curtis's 'Botanical Magazine,' t. 1573. These specimens have the beautiful starry fruit, nestled among the leaves.

13. *Mesembryanthemum*, with copious woody branches, and imbricated, small, orbicular, hairy leaves, very unlike any species with which we are acquainted.

14. *Dufourea flammea*, Ach. A handsome gold-coloured lichen, which Dr. Lindley describes as growing on the *Cerardia furcata*.

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There are some other plants, in too imperfect a state to be worth remarking upon, though sufficient to show that the merchants visiting this coast, will render a real service to science by collecting and bringing home both living and dried specimens of the vegetable productions.

C. and J. Adlard, Printers, Bartholomew Close.







